NOVEMBER
1958

FOUNDRY

A PENTON PUBLICATION

Aluminum and the Auto Industry
A manufacturer analyzes possible uses of castings in future cars—p. 92
A Shrinkage Test for Cast Iron
Good reproducibility and comparison of results provided by specimen—p. 74
Eliminating Off-Analysis Heats
Here's how one foundry corrected this problem with better methods—p. 80
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INDEPENDENT LABORATORY TESTS SHOW...

FERROCARBO® improves machinability and microstructure of gray iron castings...

Large independent laboratories conduct machining tests on untreated iron and FERROCARBO-treated iron of identical chemistry cast in leading foundries. In one case, gray iron castings showed a *surface* machinability improvement (S.M.I.) of 62%. In another, a test result of 63% was obtained on malleable castings. Other results on gray iron indicate 31.7% to 42.5% increased machinability wherever the FERROCARBO treatment was used. These are but a few of the many impressive test results on record. Performance tests like these are vitally important to buyers of castings. *FERROCARBO® in the production picture assures premium castings.*

FOR MORE INFORMATION...

on how FERROCARBO produces better machinability and microstructure regardless of metal composition, write for Forms A-1497 and A-1409—Electro Minerals Division, Dept. F84-812, The Carborundum Company, Niagara Falls, New York.

CARBORUNDUM

REGISTERED TRADEMARK

FERROCARBO DISTRIBUTORS—KERCHNER, MARSHALL & COMPANY, *PITTSBURGH • Cleveland • Buffalo • Detroit Philadelphia • Birmingham • Los Angeles • Canada*

MILLER AND COMPANY, *CHICAGO • St. Louis • Cincinnati*

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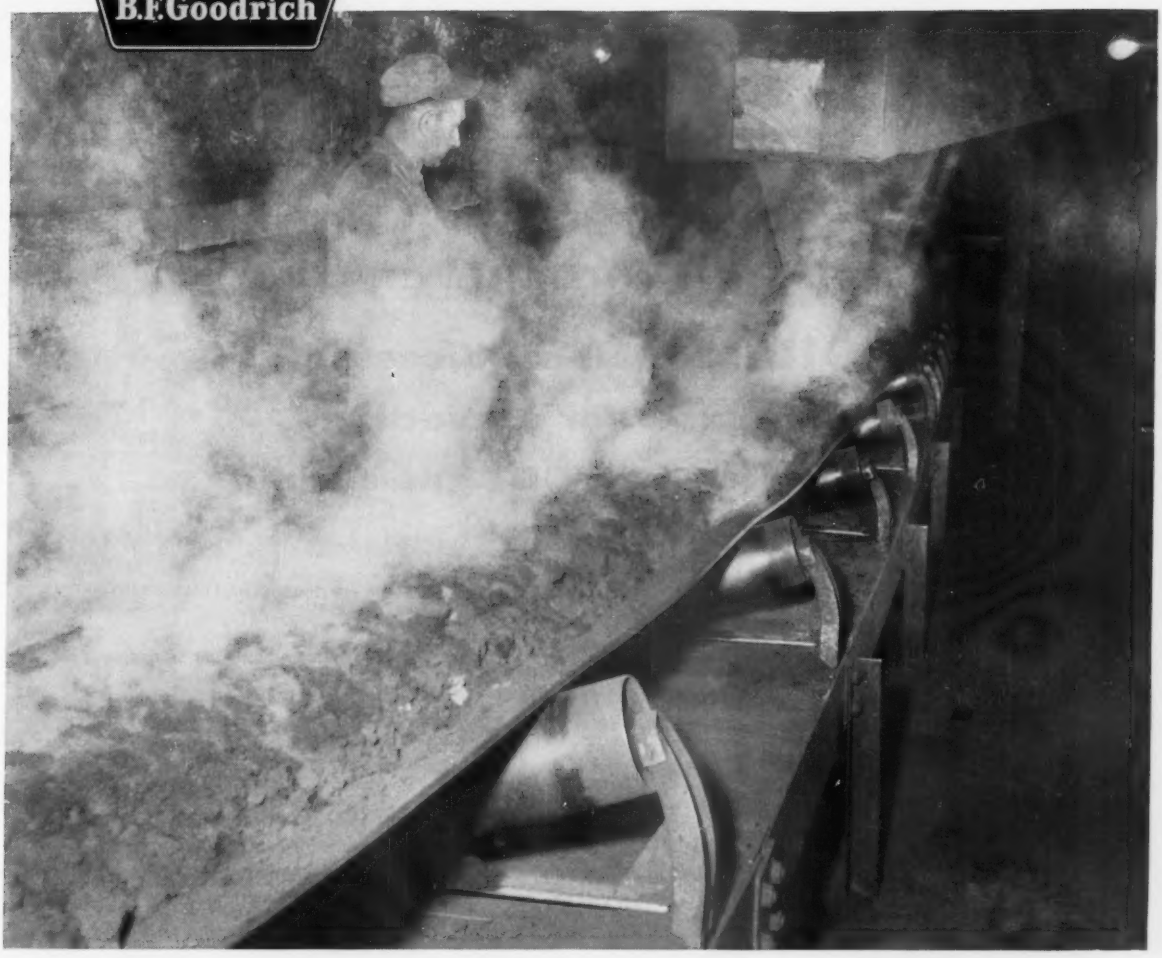
B.F.Goodrich



Foundry gets 3-times more service with B.F.Goodrich belt

B.F.Goodrich improvements in rubber brought extra savings

Problem: Steaming hot sand and metal scraps shaken from the molds at this foundry fall into a hopper (top of picture) and then are fed onto a conveyor belt. But the heat charred and hardened the rubber on an ordinary belt. This, plus the continued wear and tear of tons of hot sand and sharp, jagged metal ruined it after one year's service.

What was done: When a B.F.Goodrich distributor heard of the problem, he recommended a B.F.Goodrich belt that's made to carry such hot materials. This belt is made with a special heat-resisting rubber that can stand temperatures that would char or burn ordinary rubber belts.

Savings: The B.F.Goodrich hot material belt was put to work and lasted 3 years—three times longer than the belt it replaced. Even then, it was an accident, rather than regular wear, which made it necessary to replace it.

"No one knows how long this belt might have lasted if it hadn't been accidentally ripped," says the plant's head of maintenance. "And even in its damaged condition, it was tough enough to run another 18 months."

Where to buy: Your B.F.Goodrich distributor has the exact specifications on the belt that improved performance at this foundry. And, as a factory-trained specialist in rubber products, he can answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-470, Akron 18, Ohio.*

B.F.Goodrich *conveyor belts*

Circle 554 on Page 51

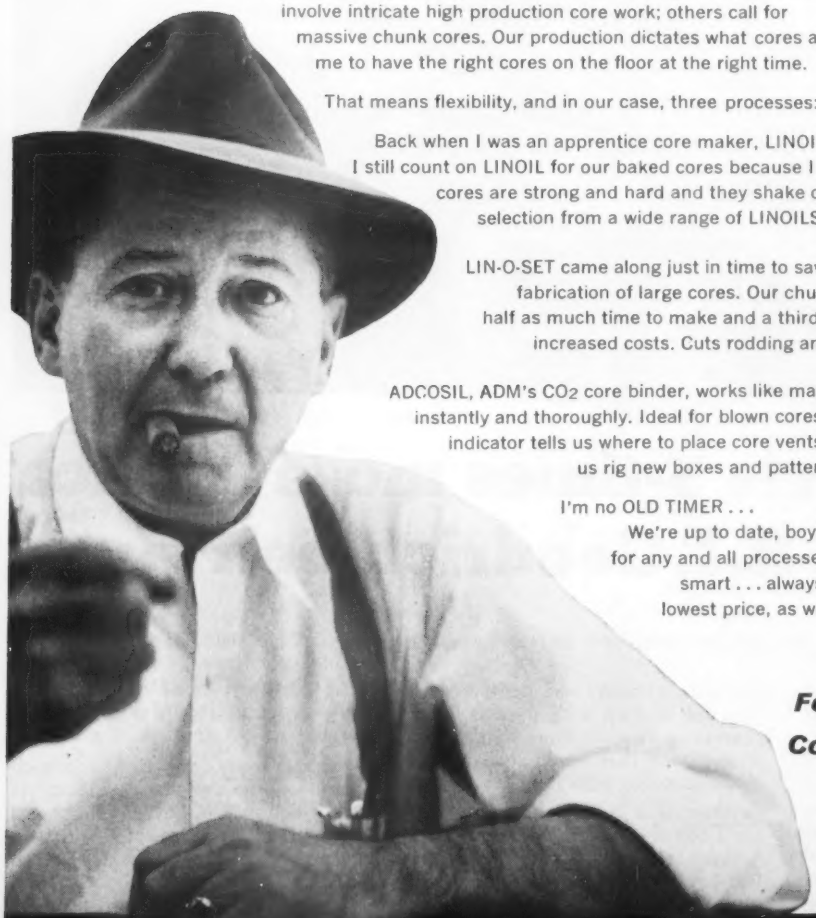
Sure, I've been running this core room since you were in knee britches. But my boss doesn't hire whiskers; he wants performance — the right cores for the job. And the work here varies all over the lot. I stay right up to date on binders, processes and brands, so —

don't call me an

OLD TIMER!

We're using all three, aren't we?

LINOIL...for oil-sand cores
LIN-O-SET...for air setting
ADCOSIL...for CO_2 gas curing



This is a jobbing foundry. We sell custom castings at a profit — some involve intricate high production core work; others call for massive chunk cores. Our production dictates what cores are needed, and it's up to me to have the right cores on the floor at the right time.

That means flexibility, and in our case, three processes: conventional, air setting, and CO_2.

Back when I was an apprentice core maker, LINOIL was the oil we depended on. I still count on LINOIL for our baked cores because I get consistent quality and uniformity – cores are strong and hard and they shake out like sugar. I can make a selection from a wide range of LINOILS for any type job.

LIN-O-SET came along just in time to save us time and money in the fabrication of large cores. Our chunk cores now take half as much time to make and a third less time to bake. Helps offset increased costs. Cuts rodding and cleaning in half, too!

ADCOSIL, ADM's CO_2 core binder, works like magic to cure intricate cores instantly and thoroughly. Ideal for blown cores. ADCOSIL with color indicator tells us where to place core vents and helps us rig new boxes and patterns.

I'm no OLD TIMER . . .
We're up to date, boy! We buy ADM-Federal core binders for any and all processes! What's more, we buy smart . . . always order mixed truckloads and get lowest price, as well as reducing our freight costs.

For Scientific Coremaking, I like –

Archer QUALITY

Archer Daniels Midland company
FEDERAL FOUNDRY SUPPLY DIVISION
2191 West 110th Street · Cleveland 2, Ohio

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FOUNDRY
A PENTON PUBLICATION

November 1958
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FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions.

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How Milt Ekberg tripled cutting

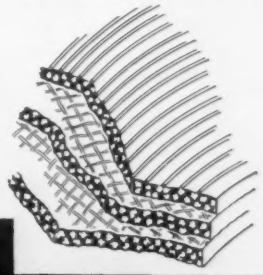
Milt Ekberg is Executive V. P. of Bay State distributor Johnson deVou, Inc., Springfield-Worcester, Mass. Twenty-five years as an abrasive engineer have given him experience that is as deep as it is wide and varied.

speed safely at Chapman Valve

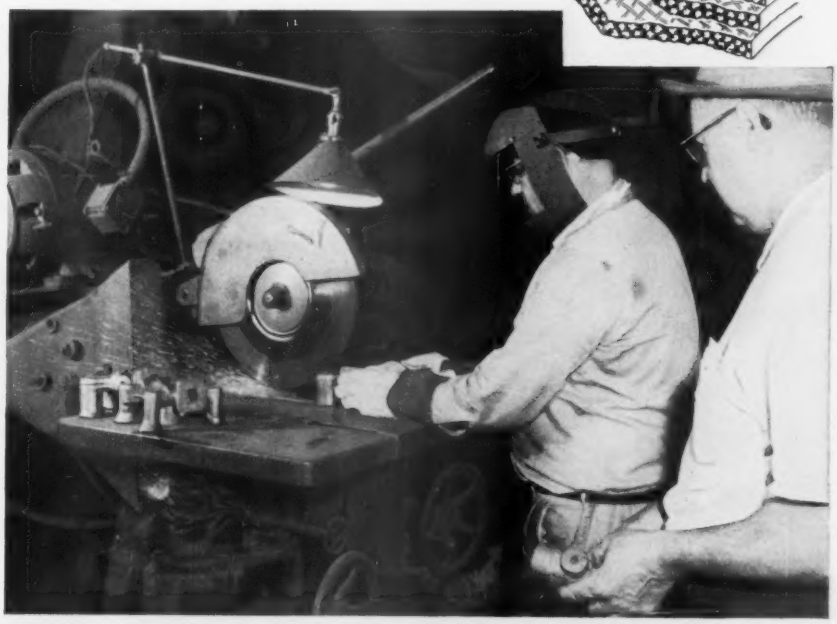
There were two big disadvantages in the old-time method of torch-cutting gates and risers off valve-body castings: A separate grinding job was required to finish off the cuts smoothly . . . and the torch-cutting method was slow and tricky. But safety engineers at The Chapman Valve Manufacturing Company, Indian Orchard, Mass., wouldn't approve using an abrasive cut-off wheel because of the danger that the wheel might shatter and injure operators.

They wouldn't approve, that is, until Milt Ekberg came up with Bay State's now famous BZ2AA reinforced cut-off wheel. Exhaustive tests of wheels supplied by all leading manufacturers proved that the BZ2AA was not only the safest but far and away the fastest, too . . . *three times* as fast, in fact, as torch-cutting. Long wheel life added further to the economies effected by the BZ2AA.

Like Milt Ekberg, your own Bay State distributor is a trained abrasive specialist. He may well have a simple, cost-cutting solution to some problem that seems insoluble simply because you're too close to it. In any case, he's a man who is well worth knowing because . . . *better grinding at lower cost, that is his business.*



Cut-away section of BZ2AA wheel shows reinforcement between layers of bonded abrasive. Improved Bay State bond formulation and bonding technique result in accurate control and close matching of wear rates of all three major components of wheel . . . bond, reinforcement and abrasive.



Steel foundry foreman Leo Labossiere, with 30 years foundry experience, watches operator Teddy Crepeau remove gates and risers, grind smooth finish in one swift and uncomplicated operation using BZ2AA reinforced cut-off wheel.

BAY STATE WHEELS of PROGRESS

BAY STATE ABRASIVES

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

Circle 565 on Page 51

COLEMAN OVENS

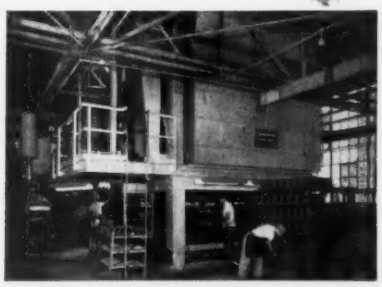
turn minutes into money...

Fast, efficient production of uniformly good cores and molds is vitally important to foundry profits.

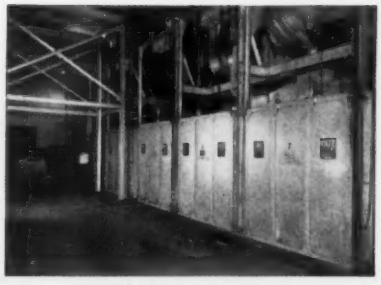
When you use old, out-dated core and mold ovens the minutes and hours lost in costly rejects and make-overs . . . the time and effort lost in wasted man power, the production lost in casting scrap eat your profits away. Modern design and exclusive advantages of Coleman Ovens result in immediate production economies, reducing overall core department costs by as much as 50% ! Such savings mean increased profits and rapid investment amortization.

More than half a century of specialized foundry oven experience is your assurance that the Coleman Oven recommended to you will do your work to your complete satisfaction. ***As builders of the world's only complete line of foundry ovens we have no reason to recommend any but the best for your purpose.*** Let our experienced engineers give you practical suggestions for your particular requirements.

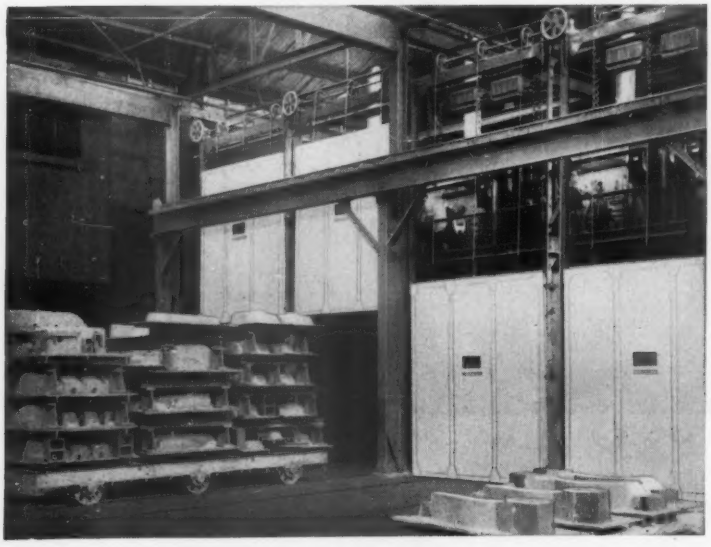
WRITE FOR BULLETIN 54



Coleman Tower® Oven



Coleman Transrack Ovens



Coleman Car-Type Core Ovens

Coleman Dielectric Oven

A COMPLETE RANGE OF TYPES AND SIZES . . .
for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY

1821 COLUMBUS ROAD **CLEVELAND 13, OHIO**

MEMBER FEMA

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Circle 557 on Page 51

Pot room in modern aluminum smelter at Isle Maligne, Quebec.

To aluminum fabricators...

who want the advantages of primary production –without the overhead

Aluminum production is a complex business. To operate a smelter made up of dozens of "pot-lines" like the one above presents innumerable problems: raw material supply, vast quantities of electric power, trained personnel, careful quality supervision—the list is nearly endless. Yet this pot-line and dozens like it in Quebec and British Columbia are at your service through Aluminium Limited.

If you would like to learn how these modern aluminum plants can work for you, call your Aluminium Limited representative. His company sells no consumer products in the U.S. Instead, it specializes in bringing you the primary aluminum you need . . . produced in a wide variety of ingot forms and alloys . . . quality-controlled to assure you every manufacturing economy. In short, all the advantages of your "own" primary production—without the overhead. For information call or write the nearest office of Aluminium Limited Sales, Inc.

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American Aluminum Fabricators

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Charles Batchelder & Company, Botsford, Conn.

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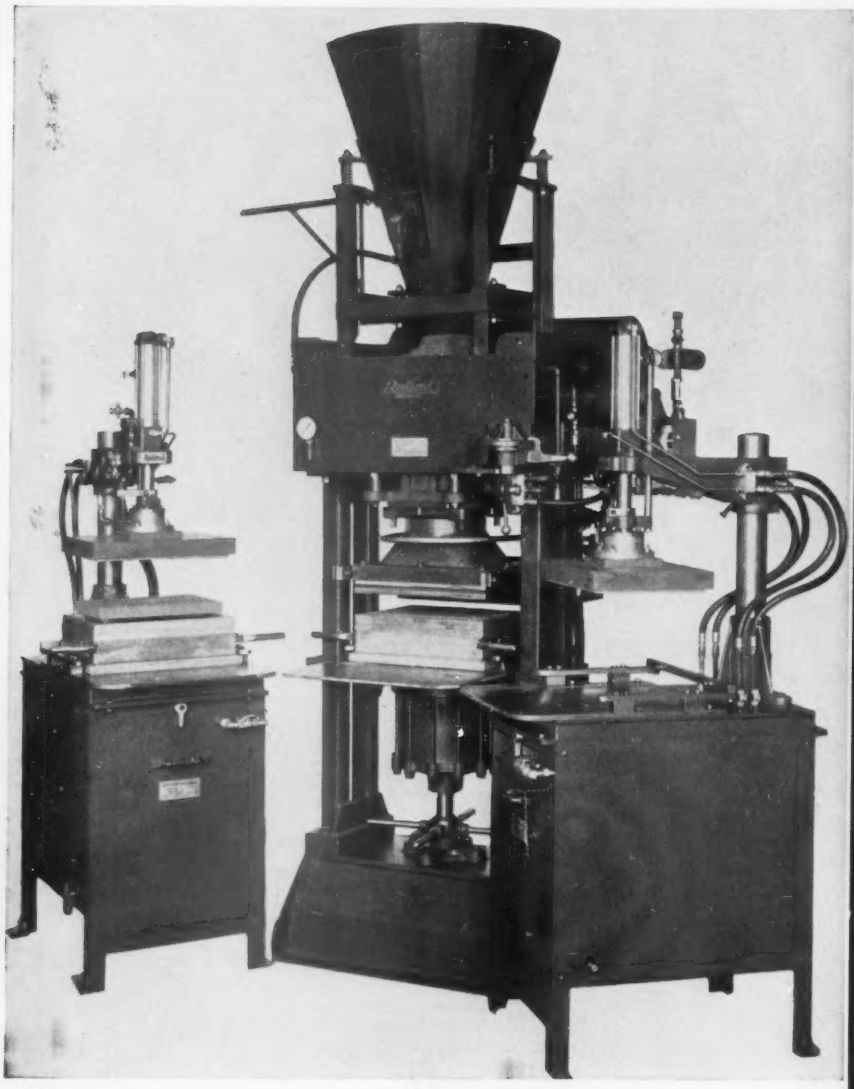


REDFORD CO_2 MOLD MAKING EQUIPMENT

Here is a proven way of applying the CO_2 process to the production of small castings. With the above Redford #420-D Core Blower and (2) Model H-2-M Gassing Stations, one mold is being blown and squeezed while another one is automatically gassed and stripped. Up to 80 complete molds (cope and drag) are produced in one hour. Molds are flat and can be stacked for pouring. Metal yield is greatly increased. Very little floor space is required. Millions of small parts have been cast to close tolerances at reduced costs. For complete information write for BULLETIN No. 421.

Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

TYPICAL CO_2 MOLD CASTINGS

½ Actual Size

If you're in a hole . . .

. . . .BECAUSE OF HIGH CLEANING ROOM COSTS, there's an easy way to cut snagging time and get back on top of the situation. Switch to CINCINNATI (PD)° SNAGGING WHEELS, the greatest grinding development in years.

It doesn't take any digging to find out what our customers think of CINCINNATI (PD) SNAGGING WHEELS. They're outspoken in their praise of the fast, easy cutting action. Our customers report, too, that POSITIVE DUPLICATION (PD) means another saving. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *And these better, cost-cutting* (PD) SNAGGING WHEELS *are priced no higher than ordinary wheels.*

So, if you want back on solid ground again, see your CINCINNATI Grinding Wheels Distributor. Or, contact us direct. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION.

CINCINNATI° *Grinding Wheels*

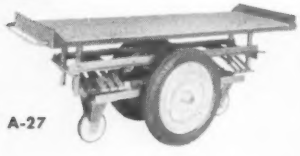
A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U.S. Pat. Off.

Circle 560 on Page 51

A COMPLETE LINE OF CORE HANDLING EQUIPMENT

MODEL C-1



MODEL A-27

You can count on CMD for the finest in core handling and allied foundry equipment. Our core trucks, barrows and racks are built to handle and transfer cores safely and easily. The secret is CMD's exclusive resiliency—a resiliency caused by coil, leaf spring and pneumatic cushioning—the smoothest core ride in the industry.

Look to CMD for superior quality, longer life, less maintenance in foundry products.

- CORE BARROWS
- CORE TRUCKS
- RESILIENT CORE RACKS
- WOODEN FLASKS
- WOODEN BOTTOM BOARDS
- BAG HOLDING TRUCKS
- CHIPPING HAMMERS
- SKIMMERS • WOOD WEDGES
- SLIP JACKETS

Send for complete information on CMD Foundry Products

CHICAGO MANUFACTURING & DISTRIBUTING CO.
1920 W. 46th St., Chicago 9, Illinois

Circle 561 on Page 51

With the Editors

WITHOUT a Foundry: What would this old world be like if we did not have foundries to produce such versatile components as castings? This surely would provide a sad state of affairs, as is related in the following verse by the author of our regular feature "Meditations of a Sandman," page 186.

A WORLD WITHOUT A FOUNDRY?
By Harold E. Henderson

A world without a foundry?
Contemplate it if you can—
A world without a muller
Or a dusky muller-man;
A world without a casting,
For a casting can't exist
If you haven't got a foundry
And a molder on your list.

A world without a foundry?
Just a picture of despair—
An oxcart and a wooden plow,
A caveman in his lair;
Where the only form of rattail
Is appended to a rat,
And the only wooden soldier
Holds a spear and wears a hat.

A world without a foundry
And its cacophonic sound,
Where no graphite dust is flying,
And no squeaky cranes abound;
Where a scab, a cut, or blister
Have no meaning, other than
Annoying skin afflictions
On the hands of careless man.

In a world without a foundry,
Man would soon forget to swear
At the helpers or the nightmen,
For these boys would not be there.
And the ones who deal in service
With their found-e-ry supplies,
Will be out there on the corner
Selling nuts or pizza pies.

Yes, a world without a foundry
Would be sad for man and maid—
No textile shop in Hopedale;
Henry Stenberg won't be paid.
All our college sand technicians
Will be sadly unemployed,
With Jay, and Clyde, and Harry, too,
And Charlie's trade—destroyed!

In a world without a foundry
There'd be no electric light
Or other household gadgets
That are now a welcome sight.
Your wife could have a washboard
And a good old rolling-pin,
But she couldn't have a Saugus pot
To cook your potroast in.

In a world without a foundry
And a FOUNDRY magazine,
There'd be no job for Bill or Frank,
And the others on the scene—
No "Man to Man" for Ralph L. Lee;
He'd end up hoeing corn.
And "Trouble Shooting" Ammen
Would be sorry he was born!

In a world without the FOUNDRY
Every month to cheer your soul,
You might as well give up the ghost
And crawl into your hole!
There's not a thing that man has made
In his metallic plan,
From a nail to a printing press,
Without a foundryman!

In a world without a foundry,
There could be no mold or core.
The flowers would lose their fragrance
And the birds would sing no more.
"Esco Bill" would cease his rhyming,
And man's life would poorer be.
Without a foundry? Brother,
It ain't no world for me!

A world without a foundry's
Like a land without a tree,
A lass without her laddie—
Sad, indeed, you must agree.
And your meditatin' sandman
Would be scribbling with a quill
On Egyptian-style papyrus,
For he'd have no typing mill.

A world without a foundry
Might as well dispense with song,
Pass a law to banish music,
Frown on joy as something wrong,
Take the candy from the children,
Never mind their mournful tears.
For the world *should be* in mourning,
If the foundry disappears!

When this earthly journey's ended,
And *you've* reached that upper shore,
Where they've never heard of castings,
Where they know no foundry lore,
Send *my* mail to lower regions.
Boy! I'll love that furnace glare!
It may be hell to others,
But—I'll feel at home down there!

—o—

Low Profits: A recent syndicated column by the financial writer, Sylvia Porter, pointed out that much of this nation's industrial capacity is obsolete and that the latest machine tools are about 40 per cent more productive than the models of 1950. The startling comment was as follows:

"To interpret that statistic with bold bluntness, it means that many prices are being kept needlessly high because our industries are using obsolete facilities and thereby are wasting billions a year in labor and materials.

"It means that many of the industries showing the smallest profits (or biggest losses) are those which are using the most antiquated facilities and which, therefore, have towering high operating costs."

Does this apply to many producers of castings?

—o—

Foundry Manual: Those teaching foundry practice, either in plant or in school, should find the 1958 edition of the *Foundry Manual*, published by the Bureau of

For Lowest Refractory Costs and Maintenance of Highest Production

HARBISON-WALKER ELECTRIC FURNACE REFRACTORIES

MAXIMUM ECONOMY results from the use of the precise kinds of refractories best suited for each particular set of electric furnace operating conditions. The many destructive factors which affect the service life of refractories can be adequately combatted only by the properly balanced selection of the refractories. Harbison-Walker produces all the different types and classes needed for the widely diversified requirements.

ROOFS STAR, the standard of quality in conventional silica brick, H-W R brand and VEGA the super-duty silica refractory, are widely preferred for their service records in electric steel melting furnaces.

Harbison-Walker super-duty fireclay brick made in five states, affording lowest transportation costs and the wide range of high alumina brands comprising all classes from 50% to 90% alumina, provide for the most severe spalling conditions and the highest working temperatures needed for various alloys.

These refractories of special merit are:

Super-Duty Fireclay Brick
ALAMO—DEAN—BOONE—H-W SUPER SAVAGE—KALA

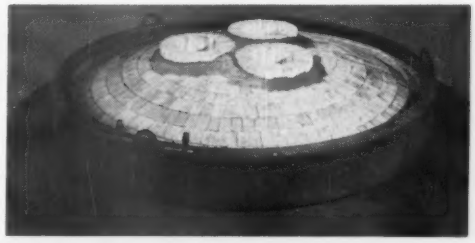
High Alumina Brick

KORUNDAL 90% Al_2O_3	ALCOR XX 60% Al_2O_3
ANCHOR 60% Al_2O_3	H-W MULLITE 70% Al_2O_3

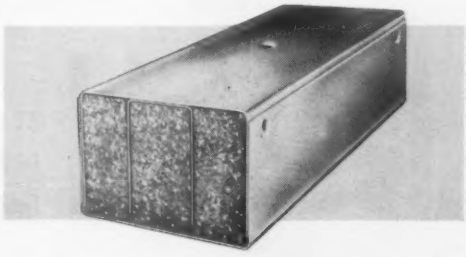
In addition to simplified roof shapes of relatively small unit sizes, including various modified 9" brick, several H-W monolithic refractories of excellent durability, greatly facilitate installation. Leading brands are KORUNDAL RAMMING MIX, CORALITE RAMMING MIX and H-W HIGH ALUMINA CASTABLE.

BOTTOMS H-W C MIX (high purity seawater periclase) used for contour-rammed open hearth and electric furnace bottoms greatly reduces furnace downtime, saves labor and avoids burning-in sacrifice of refractory construction. And with its measurable margin of superior properties, costs are decidedly lower and furnace availability is greatly increased.

SIDE WALLS METALKASE brick are available in several modifications of both chemically bonded and hard fired basic brick, preformed under great pressure and firmly encased in soft steel containers of the optimum weight for electric furnace use. This refractory in its several forms is highly resistant to thermal spalling and to corrosion by highly basic slags.



METALKASE XXP are chemically bonded basic brick with two internal plates, formed under high pressure. They are available in various compositions. These internally plated brick have superior spalling resistance and appreciably reduced tendency to peel.



New refractories, products of intensive research, with quality rigidly controlled, H-W technical service and balanced selection based on availability of all kinds of refractories from one source, assure maximum economy.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES **General Offices: Pittsburgh 22, Pennsylvania**
World's Most Complete Refractories Service

Circle 562 on Page 51

Engineered for longer crucible life!

■ In the Oil Fuel models, as shown, the special higher-pressure mechanical atomizing oil spray—a Hausfeld exclusive – produces a clear, hot flame with minimum cutting action . . . *increases* crucible and lining life.

■ Well insulated lining assures uniform heat dispersal – cuts heat loss and assures many years of fast, efficient melting of brass and bronze.

With crucible sizes from #10 to #400 . . . capacities 30 lbs. to 1200 lbs. brass and bronze (copper alloys) there is a Hausfeld Stationary Crucible Furnace to meet your non-ferrous melting needs. Write today for Bulletin #102. The Campbell-Hausfeld Co., 300 Moore St., Harrison, Ohio.

interchangeable for OIL or GAS FUEL

Hausfeld STATIONARY CRUCIBLE FURNACES

CAMPBELL-HAUSFELD
METAL MELTING FURNACES

Ships, Navy Department, Washington, interesting and valuable. The book is a revision of the manual first published in 1944.

While prepared primarily as a guide for foundry personnel on board repair ships and tenders, it provides recommended practices on procedures which have proved workable under many conditions. The text covers solidification of metals; casting design; patternmaking; sand molds and cores; making molds; making cores; gates, risers and chills; operation of melting furnaces; pouring; cleaning; causes and cures of defects; heat treatment; specifications; copper-base alloys; aluminum; nickel; gray iron; steel; and process control.

The 291-page publication may be obtained from the Superintendent of Documents, Washington 25, D. C., for $3.

—o—

Loads of Information: Manufacturers of equipment and supplies used by the foundry industry are excellent sources of valuable information which will aid in the production of better castings at lower prices.

Representatives of these vendors calling on foundrymen constantly provide help in solving foundry production problems. I sometimes wonder if the foundry industry realizes the important contributions these representatives make to progress in the production of castings.

Information from these sources also is available in another form. Most organizations serving the foundry industry prepare folders, booklets, catalogs, and data which are available for the asking. You frequently will find the suggestion "write for a booklet" in the advertising pages of FOUNDRY.

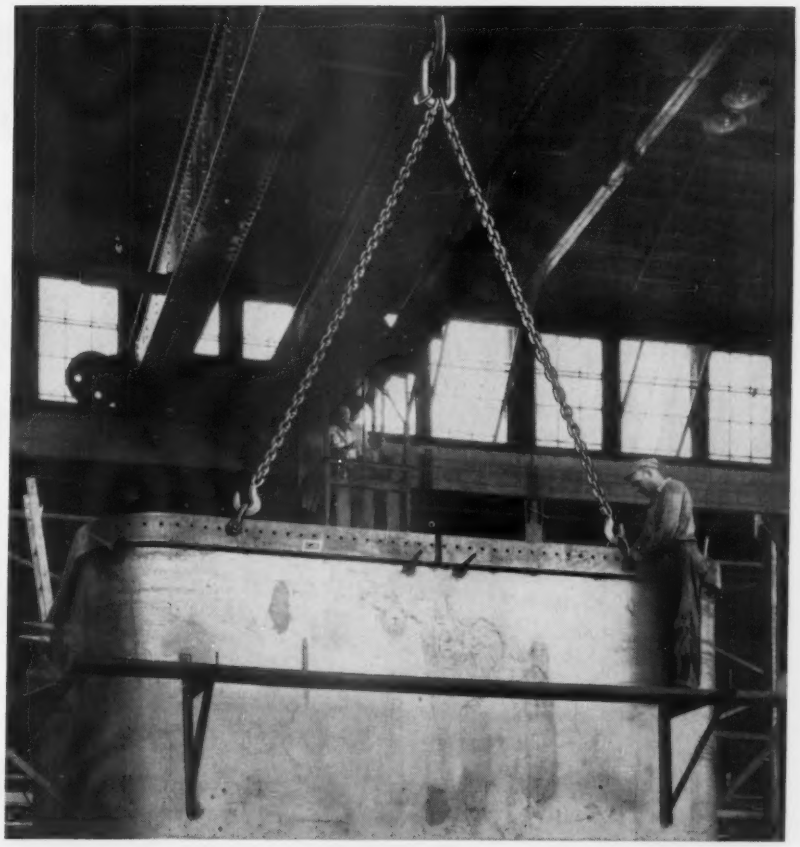
As a service to readers FOUNDRY presents a special feature, "Literature for Foundrymen," in each issue. We include an insert having three return postal cards which may be used not only to secure copies of the various items of foundry literature described in the issue, but also more information on the items described in the regular feature "Foundry Equipment and Supplies Digest."

If you have not been taking advantage of this educational service, we urge that you look in this issue at "Literature for Foundrymen" on page 168 and "Foundry Equipment and Supplies Digest" on page 155.

You don't really know what you may have been missing.

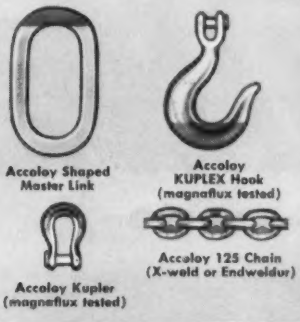
F. G. S.

NOW... Get One-Day Service from our Authorized Distributor on



NEW ACCOLOY KUPLEX SLING CHAINS

• Imagine... you can now get ***one-day delivery service*** on ACCOLOY KUPLEX Chain Slings like you see here from our nearby Authorized KUPLEX distributor! This really remarkable development in speedy sling service is made possible by the new KUPLEX coast-to-coast system of localized service to meet your sling chain needs. No more waiting around for shipments from the factory . . . no more returning damaged slings to the factory for repairs. Our KUPLEX distributor is equipped to offer you both of these valuable services, and he's as near to you as your telephone.


Accoloy Shaped Master Link
Accoloy KUPLEX Hook (magnaflux tested)
Accoloy 125 Chain (X-weld or Endweldur)
Accoloy Kupler (magnaflux tested)

KUPLEX is a modern sling chain that has been tried and proved through thousands of applications. Its streamlined form greatly reduces the chance of snagging on other objects. KUPLEX Sling Chains are assembled from genuine ACCOLOY KUPLEX component parts which have been factory proof-tested at twice their specified load limits. Each part is designed and manufactured specifically for use with all other parts of the complete KUPLEX sling assembly. These matched components are made to ACCO *Registered* Specifications from heat treated ACCOLOY steel, and are engineered to be as strong as the chain itself. Hooks and Kuplers are magnaflux-tested. In addition, you are assured of complete safety—with genuine component parts—by a CERTIFICATE OF TEST issued by ACCO and signed by the distributor with each complete sling purchase.

• • •

Write our York, Pa., office for the name of the Authorized Kuplex Sling Distributor nearest to you.

SIX CHAIN SIZES WITH THESE FOUR COMPONENTS

• A nearby Authorized ACCOLOY KUPLEX Sling Distributor can furnish promptly from his stock the exact sling chains you need for your specific requirements; made up from the components shown above. Six chain sizes (¼" through ⅞") are available in single, 2-leg, 3-leg or 4-leg styles.

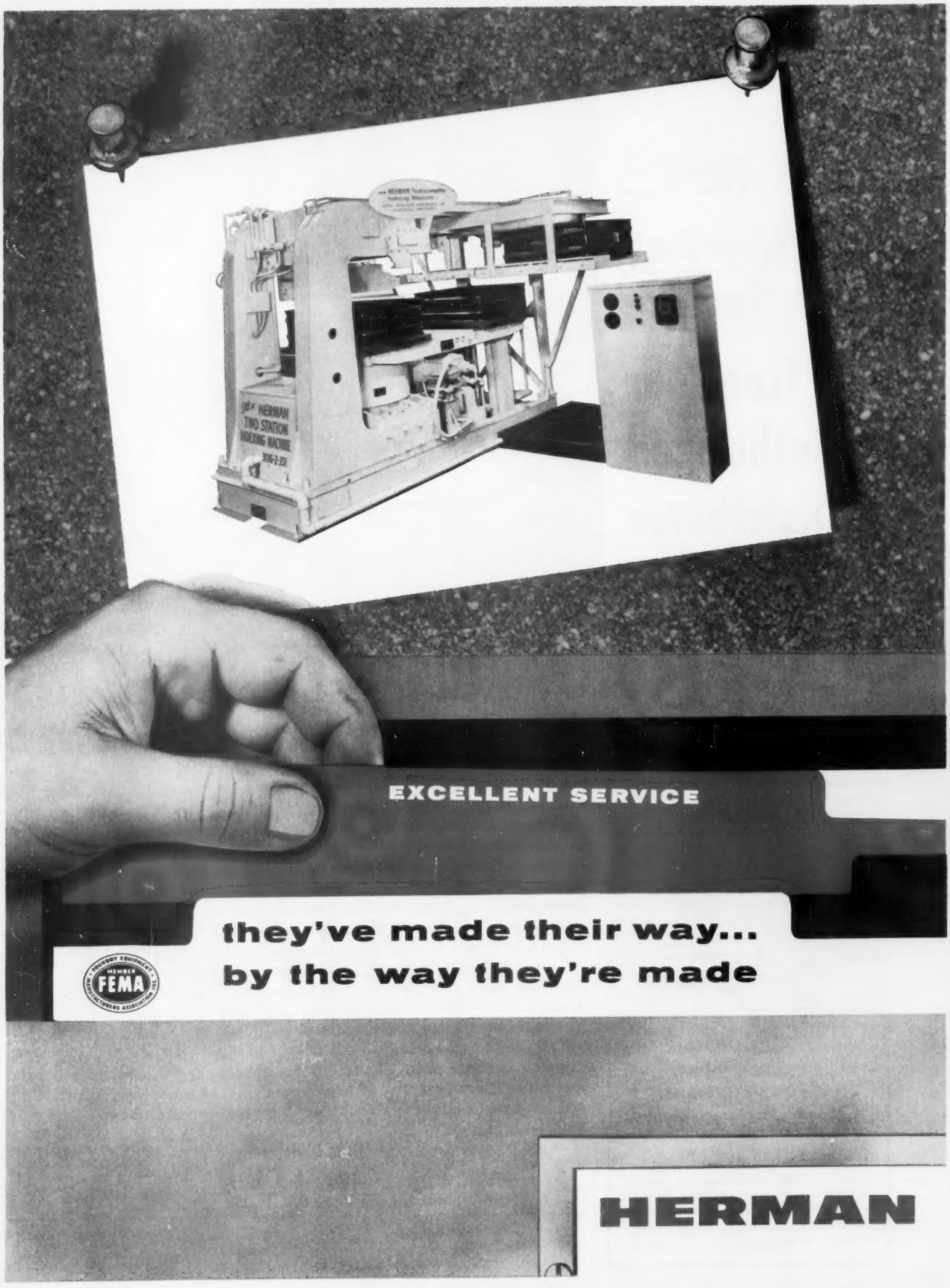
American Chain Division
AMERICAN CHAIN & CABLE
Bridgeport, Conn. • Factories: *York and *Braddock, Pa.

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

*Indicates Warehouse Stocks

ACCO TRADE MARK

Circle 564 on Page 51


HERMAN
TWO STATION
INDEXING MACHINE
EXCELLENT SERVICE
they've made their way...
by the way they're made
MEMBER
FEMA
HERMAN

SERVICE is a lot more than just a word used in discussing the reasons for buying a Herman molding machine. It is a symbol which has been an integral part of the reputation enjoyed by this company with its customers.

Herman Service Engineers take the providing of service far beyond a dictionary meaning and apply it on a practical level.

For example: Just before a holiday recently, a customer called at 6:00 P.M. advising that heavy operating usage has caused breakage on a central rotating turret casting; he was in trouble because of an accelerating downtime and needed a replacement fast. Our plant immediately called the purchasing agent to discuss what was required; the order was placed verbally.

Prior to the end of this holiday period, due to excellent service co-operation from suppliers, straight-through delivery, and most importantly, our own desire to provide good service, the fully machined casting was delivered.

Eight Herman engineers are available for service work at all times, traveling extensively throughout the country to back-up our operating promises.

In the case of our Stationmaster Machine, we provide a Service Engineer on location at the customer's plant, for 20 working days at no charge. It is his service responsibility to see that the customer is satisfied with mold production. The same policy applies for our Moldmaster installation.

We further provide, at no obligation, three working days of service time on installations of our small standard molding machines.

Normally, we ship stock parts for our machines the same day the order comes in.

We often review the condition of used Herman machines, to provide advice to potential buyers.

This type of Service policy gives our customers a confident feeling that we sell quality molding machines on the basis that "They've Made Their Way By The Way They're Made—and Serviced."

FAST DELIVERY

EASY MAINTENANCE

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

Best Known Name in Molding Machines

Circle 556 on Page 51

NOW! save up to 50%

in BINDER COST with

NEW STEINEX

SLOWER-HARDENING BINDER

Specifically designed for BENCH WORK and CORE BLOWER use

CarVer FOUNDRY PRODUCTS
Muscatine, Iowa

Please rush information and prices on new Steinex binders.

NAME _____ TITLE _____

FOUNDRY _____

CITY _____ STATE _____

Calendar of MEETINGS

Oct. 31-Nov. 1—Northwest Regional Foundry Conference, Multnomah Hotel, Portland, Oreg.

Nov. 5-7—Industrial Management Society, annual industrial engineering and management clinic, Sherman Hotel, Chicago.

Nov. 10-12—Steel Founders' Society of America, Technical and Operating Conference, Carter Hotel, Cleveland.

Nov. 11-13—Investment Casting Institute, management meeting, Roosevelt Hotel, New York.

Nov. 12-14—Society for Experimental Stress Analysis, annual meeting, Sheraton-Ten-Eyck Hotel, Albany, N. Y.

Nov. 14—Malleable Founders' Society, shop practice meeting on slag control, Commodore Hotel, New York.

Nov. 18-20—National Conference on Air Pollution, Sheraton-Park Hotel, Washington.

Nov. 20—Malleable Founders' Society, shop practice meeting on slag control, Hotel Cleveland, Cleveland.

Nov. 20-21—National Foundry Association, annual meeting, Drake Hotel, Chicago.

Nov. 21—Malleable Founders' Society, shop practice meeting on slag control, Drake Hotel, Chicago.

Dec 3—Foundry Facings Manufacturers Association, annual meeting, Waldorf-Astoria Hotel, New York.

Dec. 3-5—American Institute of Mining, Metallurgical, & Petroleum Engineers, Electric Furnace Steel Conference, Detroit.

Dec. 7-9—Material Handling Institute, annual meeting, Roosevelt Hotel, New York.

1959

Jan. 16—Malleable Founders' Society, industry meeting, Hotel Cleveland, Cleveland.

Jan. 19-20—Industrial Heating Equipment Association, annual meeting, Hotel Cleveland, Cleveland.

Jan. 26-29—Plant Maintenance & Engineering Show and Conference, Public Auditorium, Cleveland.

Feb. 12-13—Malleable Founders' Society, Technical and Operating Conference, Wade Park Manor Hotel, Cleveland.

Feb. 12-13—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee.

Feb. 19-20—Southeastern Regional Foundry Conference, Hotel Tutwiler, Birmingham.

March 9-10—Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

March 13-14—California Regional Foundry Conference, Huntington Hotel, Pasadena, Calif.

March 16-20—American Society for Metals, plus other technical groups, Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles.

March 18-19—Foundry Educational Foundation, annual College-Industry Conference, Statler-Hilton Hotel, Cleveland.

April 8-9—Malleable Founders' Society, Market Development Conference, Hotel Cleveland, Cleveland.

April 13-17—AFS Castings Congress & Engineered Castings Show, Hotels Sherman and Morrison, Chicago.

May 13-15—National Industrial Sand Association, annual meeting, Homestead, Hot Springs, Va.

May 25-26—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

Circle 566 on Page 51

WHEELABRATOR®

CLEANS UP TO 100 TON CASTINGS IN 15 TO 20 MINUTES

Giant steel castings, weighing up to 100 tons each, and measuring 20' in diameter x 12'2" in height are cleaned in from 15 to 20 minutes in a Wheelabrator Car-Type Room at Canadian Steel Foundries (1956) Ltd.

The enormity of these castings would have presented formidable difficulties to any other method of cleaning. But the Wheelabrator Car-Type Room, equipped with eight Wheelabrator blast wheels and throwing approximately 4000 lbs. of abrasive per minute, handles them with ease.

The push button controlled Room is fully automatic. Castings are brought into the blast room on a work car. The abrasive barrage of the Wheelabrator units quickly breaks away scale and sand, insuring a thoroughly cleaned casting. Provisions are made in the blast room for spot air blasting of deep, inaccessible areas, although this operation is rarely required.

Wheelabrator engineers, long experienced in designing machines for special applications, have developed a line of Wheelabrator Rooms employing unique work-handling mechanisms to meet varied requirements.

50 YEARS OF PROGRESS
WHERE PIONEERING LEADERSHIP INSURES PERFORMANCE

WHEELABRATOR
CORPORATION

505 South Byrkit Street Mishawaka, Indiana
Canadian Offices: Scarborough (Toronto) – Montreal

For complete information on Wheelabrator Car-Type Rooms and other special cleaning equipment, write for Catalog No. 105-D.

WORLD'S LARGEST MANUFACTURERS OF AIRLESS BLAST CLEANING EQUIPMENT AND STEEL ABRASIVES

Circle 567 on Page 51

YOU'LL DO A BETTER JOB

with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

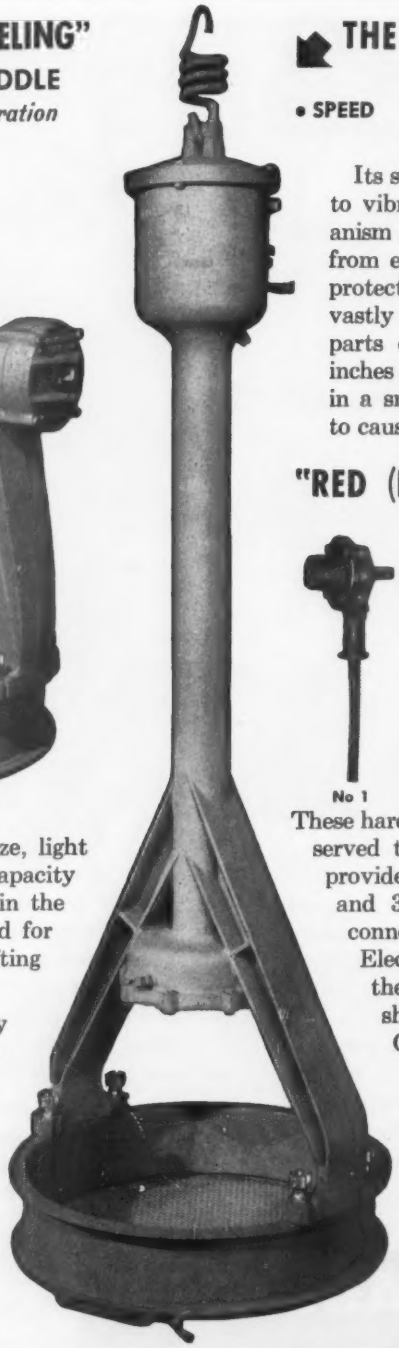
with the Double Eight Vibration

Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



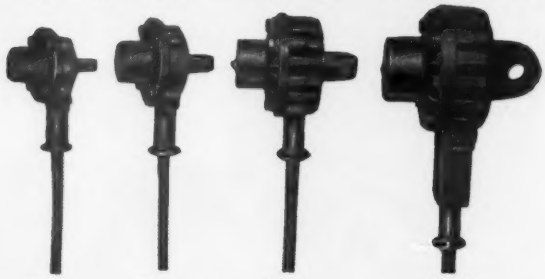
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area—are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 No. 2 No. 5 No. 9

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

Soffel's

THERMOTOMIC HoTop

For Short Head Castings

SAVES 5 WAYS

1. PERMITS LOWER COPES
2. LESS SAND HANDLING
3. ASSURES SOUND, SHRINK-FREE CASTINGS
4. UP TO 35% LESS MATERIAL THAN COMPETITIVE PRODUCTS
5. REDUCES PRODUCTION TIME AND COSTS . . INCREASES YIELD!

Distributors

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Klein-Farris Co., Inc.
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BUFFALO 12, N. Y.
Frederic B. Stevens, Inc.
93 Stone Street

CHICAGO 38, ILL.
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Frederic B. Stevens, Inc.
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Midwest Fdry. Supply Co.
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INDIANAPOLIS 7, IND.
Frederic B. Stevens, Inc.
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Canfield Fdry. Supply & Equip.
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LOS ANGELES 22, CALIF.
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Milwaukee Chaplet & Supply Corp.
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Smith-Sharpe Company
117—27th Avenue S. E.

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NORTH BIRMINGHAM, ALA.
Foundry Service Co.
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Marsella 78 Apartado Postal 2783

Soffel's Thermotomic HoTop produces sound, shrink-free castings . . but even more important, they increase metal yield!

By reducing the percentage of unuseable metal at the top of every casting, they add an appreciable EXTRA profit to every pour.

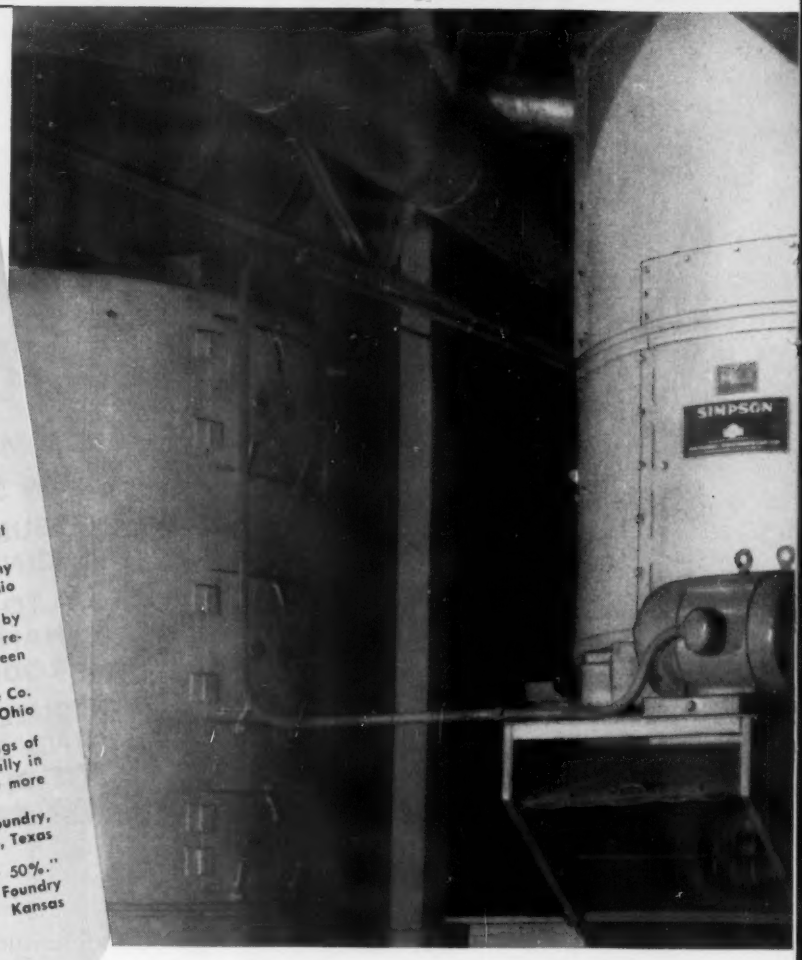
From a dollar and sense standpoint, call your nearest PMP distributor to arrange for a demonstration in your plant under your supervision. Only then will you be able to estimate impressive savings involved. Call your distributor today!

PITTSBURGH METALS PURIFYING CO., INC.
Mars, Pennsylvania

"WORLD'S LARGEST MANUFACTURER OF FLUXES, PURIFIERS AND EXOTHERMIC COMPOUNDS FOR ALL METALS AND ALLOYS"

Circle 569 on Page 51

One of a series on: **why practical foundrymen select**



Henry Furnace Company, Medina, Ohio
uses 50% less bonding material since installing 2F Mix-Muller.

American Abrasives Metal Co., Irvington, N. J.,
saved $2500 in bond alone during first year operating their 2F Mix-Muller.

Studebaker-Packard Corp. Manifold line
—Sand output tripled: sand quality improved . . . moisture control improved . . . since installation of 2½F Mix-Muller. Is one of 13 Mix-Mullers used at South Bend, Ind. Foundry.

"Use of bond in system has been cut by 50% with no loss in quality."
Superior Foundry Company Cleveland, Ohio

". . . our mulling cycle has been cut by 30% due to increased capacity and reduced mulling time. Facing has been eliminated."
Xenia Foundry & Machine Co. Xenia, Ohio

"Mixer has paid for itself in savings of costly materials . . . and principally in the fact that our results are now more consistently uniform."
Pioneer Foundry, Houston, Texas

". . . also reduced binder by 50%."
Grey Iron Foundry Kansas

How Simpson mulling principle can save you up to 50% in bond cost

When a batch of sand and bond is mulled the sand will achieve *most* of its green strength early in the process . . . But, *most* isn't always good enough to do all jobs. Scrap, inferior castings, wasted time, money and material are poor reward for a half mulled batch of foundry sand—when the total savings in mulling time may be less than a minute.

There is another way to save mulling time . . . *use a great deal more bond.* You'll get your strength but it will still be earned at the expense of questionable sand quality . . . and bond is costly.

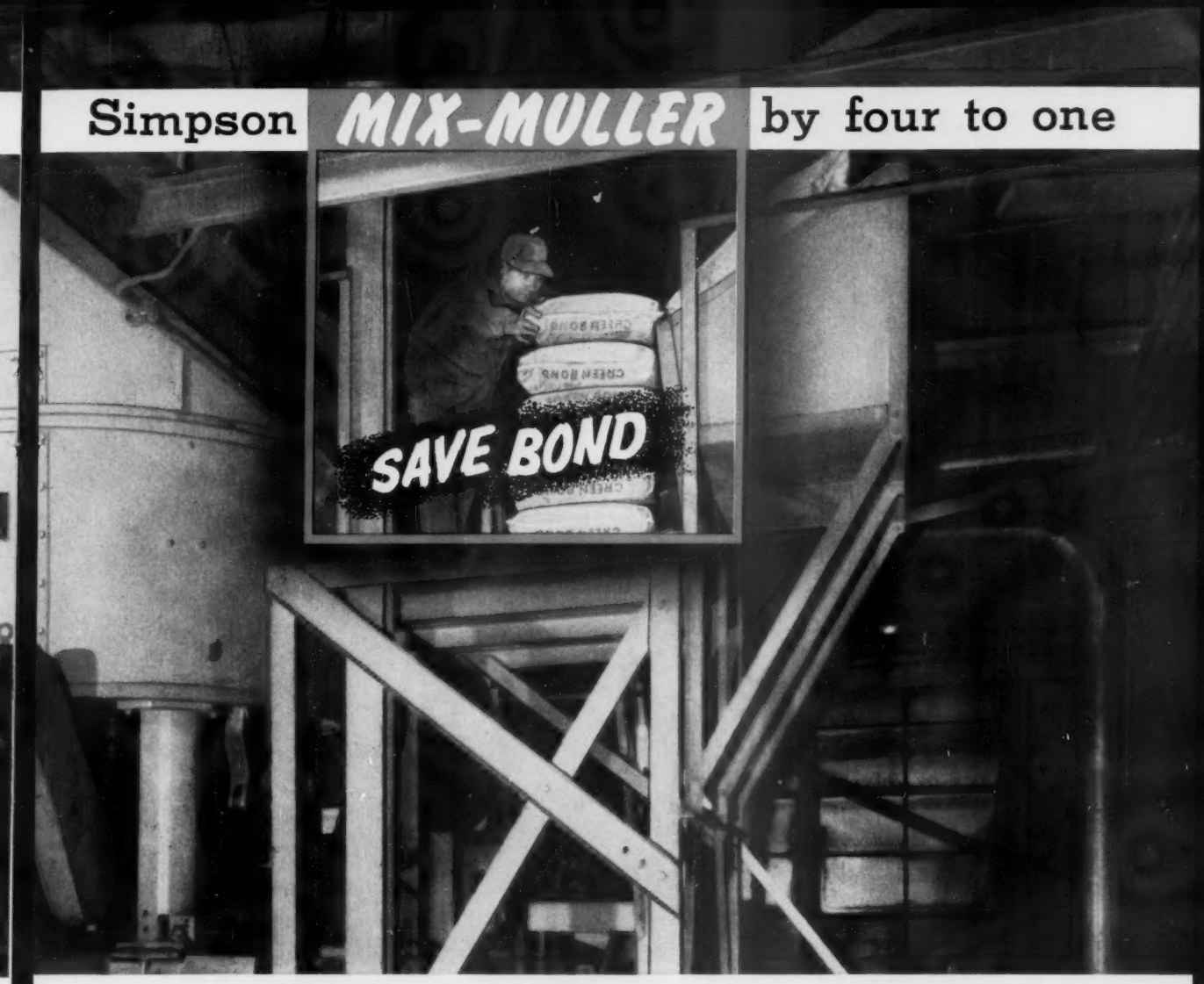
Some foundrymen make a choice—time or bond, but many more *get both* by doing one of two things:

(1) Changing to Simpson Mix-Muller

(2) Using their present Mix-Muller wisely

These *practical* foundrymen know from experience, that they may mull a batch a little longer in a Simpson but they also know that, model for model, the Mix-Muller can turn out more, better sand in a given time than any other sand mixer!

Simpson MIX-MULLER by four to one



Yes, you can save on bond with the Mix-Muller . . . up to 50% as reported by users—but you'll save in six other ways too. Combined, these savings mean much more to practical foundrymen than a few seconds saved in mulling. They are the reason why, for almost 50 years, Simpson Mix-Muller has been the choice of *practical* foundrymen by four to one over any other means of sand preparation.

ANOTHER!
PROVEN PRODUCT OF THE PRACTICAL FOUNDRYMAN
BY NATIONAL

SIX WAYS YOU SAVE WITH MIX-MULLER

GET MORE FOR YOUR EQUIPMENT DOLLAR WITH MIX-MULLER
Model for model, you'll mix more sand—get more tonnage per hour with large capacity Mix-Muller.

SAVE RAW MATERIALS WITH MIX-MULLER
Only *true* mulling permits you to use lean mixtures. You'll make the most of *less* oil, binder and other additives—and get top quality sand at the same time.

YOU SAVE SCRAP WITH MIX-MULLER
True mulled sand cuts down on casting, mold and core scrap.

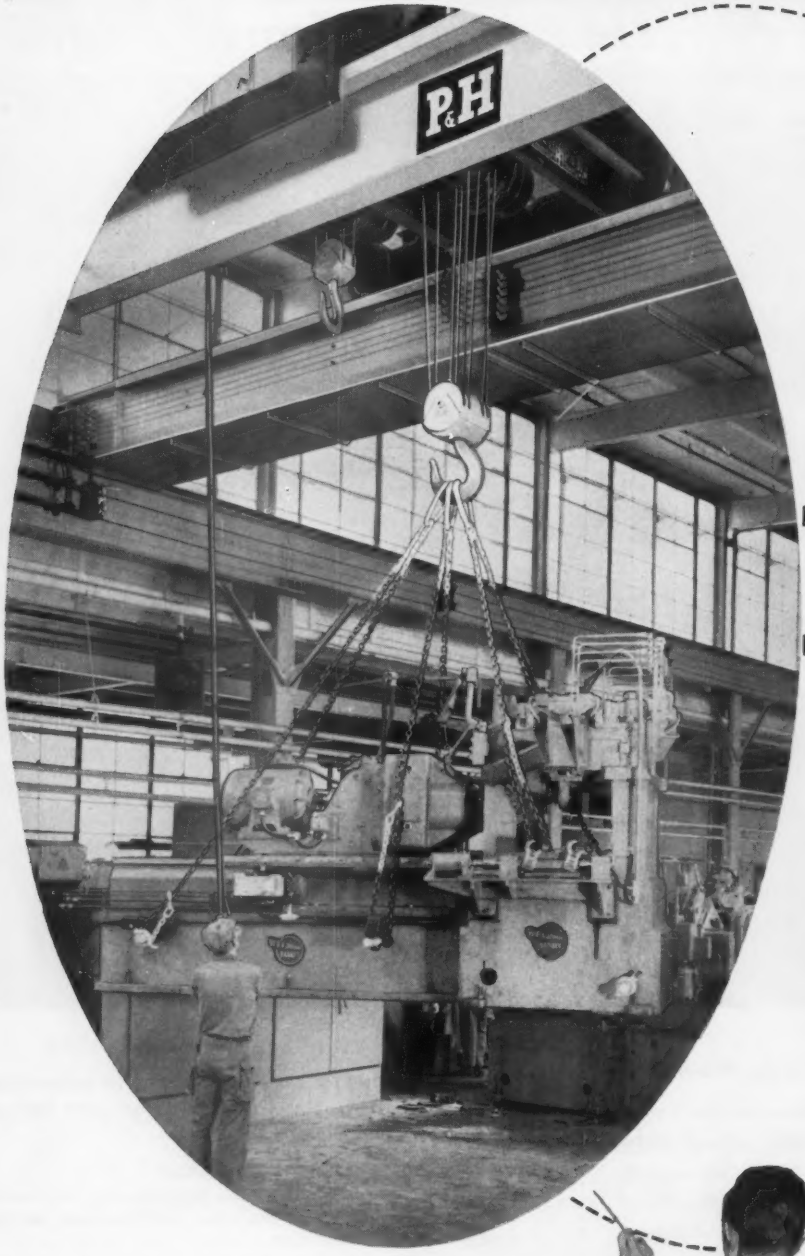
YOU SAVE CLEANING COSTS WITH MIX-MULLER
Uniformly coated sand means better finish—right from the mold with less cleaning time.

YOU SAVE POWER WITH MIX-MULLER
Mix-Muller takes only about ½ the power of other machines —to do the same or a better job. Only power required is used to plow and to roll mullers over the sand.

YOU SAVE MAINTENANCE WITH MIX-MULLER
Simple, rugged construction makes Mix-Muller easy to operate, maintain—and get parts for. Low speed mulling insures longer wear and part life to save you materials and man hours.

National Engineering Company, 646 Machinery Hall Bldg., Chicago 6, Ill.

Circle 570 on Page 51



find out about the low price of

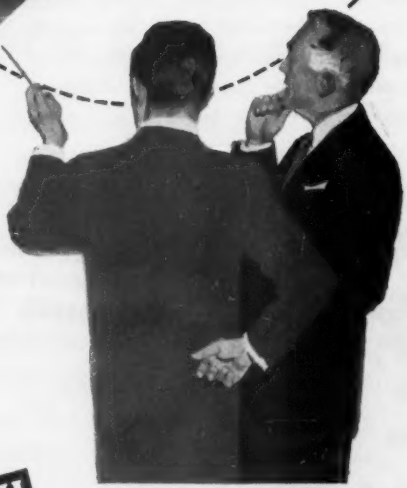
P&H trav-lift

before buying your next crane!

Only P&H Trav-Lift® offers all these features in the 1 to 20 ton crane class:

- P&H one-source responsibility
- Electrical equipment designed specifically for crane service
- Maintenance-saving mill-type rectifier brakes
- Either cab or floor operated — or both!
- All-welded steel construction
- Bridge engineered for vertical strength and lateral stability
- Heat treated gearing throughout
- Forged steel wheels

Compare first — then specify! Dept. 123N, Harnischfeger Corp., Milwaukee 46, Wisconsin.



You can buy the Trav-Lift crane — packed with big-crane features — for far less money than you think!

HARNISCHFEGER P&H ... quality and service for 74 years

Rough finishing of a sluiceway liner used in industrial furnaces. Foundry: Rosedale Foundry & Machine Co., Pittsburgh, Pa.

KEYSTONE

Keystone snagging wheels take the toughness out of this tough job.

Keystone Abrasive Wheel Company

Carnegie, Pennsylvania • Phone: WAlnut 1-7036

Keystone Personalized Service gets results, fast. Call us today!

DISTRIBUTORS: Desirable territories open.

Circle 572 on Page 51

Data from the
SILICONES MAN

COMPARE THE BUILD-UP of these shell molding parting agents

Shell Molding processes give fewer rejects when release agent build-up is minimized. Test panel on the left has been sprayed with UNION CARBIDE LE-460, panel on the right with another silicone release agent. Both panels pre-heated to 250 deg. C. You can see the difference!

This test shows how the wrong release agents can build up and destroy tolerances in your shell molding process. But UNION CARBIDE LE-460 Silicone Emulsion release agent does not build up. With LE-460 Emulsion you get improved release, fewer rejects. And less time is lost for mold cleaning.

A unique process is used in compounding UNION CARBIDE LE-460 Silicone Emulsion. The result: even dispersal of the active silicone ingredient over the entire pattern surface—even when diluted with water 200 to 1! Water hardness will not cause separation . . . nor will pumping, aeration or repeated freeze-thaw cycles. LE-460 is delivered as a concentrate. You dilute it with ordinary tap water to suit your needs.

Your Silicones Man has a great wealth of information about silicone release agents . . . in the chemistry, properties and many applications of UNION CARBIDE Silicones. Call the UNION CARBIDE Silicones Man today; he has offices in most major cities. Or write for technical literature on "Silicones for the Shell Molding Process." Address Dept. KG-4801, Silicones Division, Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

Unlocking the secrets of silicones
Rubber, Monomers, Resins, Oils and Emulsions

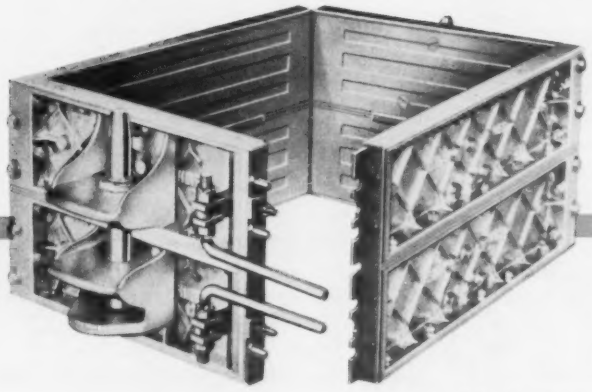
"Union Carbide" is a registered trade-mark of UCC.

UNION CARBIDE TRADE-MARK SILICONES

HINES straight-wall "HINGE-OFF" FLASKS

One of many **HINES** *developments contributing to better foundry production*

Lightweight metal flasks, recommended for hand and mechanical molding of loose match plate and cope and drag plate patterns, up to 20″ in length.



PATENTS PENDING

- Made of metal, the "HINGE-OFF" maintains alignment — will not warp from absorbing moisture.
- Positive, fast-acting locking mechanism aligns and locks the open end rigidly, to prevent shift.
- Only one adjustment — tightening the nuts on the locking mechanism. Low maintenance cost — flasks can be repaired and aligned in your own plant.
- No wood screws to work loose!
- Accurate pins and guides, and pin center alignment.
- Lengths and widths, 10″ to 20″. Depths from 6″ to 11″. Standard HINES pins, bushings or guides. Upsets and bands can be supplied.

WRITE FOR CATALOG FOLDER NO. 203

THE HINES FLASK CO.

3431 WEST 140th STREET • CLEVELAND 11, OHIO

HINES FLASKS

Circle 574 on Page 51

Even the smallest-size Heroults have big electric furnace features!

Now, while you've got time to catch your breath, is a good time to take a searching look at your foundry facilities. In the face of the obviously keener competitive period ahead, wouldn't you be smart to modernize your melting equipment—to switch to electric furnaces—and be ready for the business upturn that's coming? *You can install a Heroult now with minimum inconvenience to plant operations.*

The Heroult Electric Furnace helps you produce better-quality steel . . . faster . . . and more economically

Available in standard sizes of shell diameter ranging from 7′0″ on up, and with capacities of from 1½ tons up to 200 tons, the improved Heroult is unquestionably the finest electric melting furnace on the market. The features listed below are found in all standard Heroult's—even the smallest.

The Heroult Furnace is 100% mechanically operated.

It includes such mechanical features as: heavy rack-and-pinion-type tilting mechanism; mechanical roof lift; motor-driven, rotating, jib-type roof swing; winch-operated, water-cooled jib-type door-lifting mechanism; and high-speed, electro-mechanical electrode-positioning mechanism.

Another exclusive—cage-type shell construction with shell plates clipped to a heavy supporting structure. This construction minimizes shell warping and allows easy replacement if shell plates are damaged.

Exclusive—Operating Mechanism Independently Supported.

The tilting platform on which all operating mechanisms are supported is attached directly to the rockers independent of the shell structure. Thus operating mechanisms are unaffected by any shell distortion.

Exclusive—Flat-Bottom Shell.

This feature facilitates easy shell relining and provides maximum protection against burnouts. Thicker refractory at the sides of the hearth promotes more uniform bath temperature.

Exclusive—Water-Cooled, Skew-Back Roof Ring.

This feature eliminates the need for special skew-shaped roof refractories.

Electrode Mast Safety Device.

This spring-loaded, rack-and-pawl-type device provides positive protection against damage resulting from electrode-winch cable breakage.

Square-Sectioned, Water-Cooled Electrode Mast Arms.

This design guarantees a rigid connection between mast and mast arm, thus helping to maintain proper electrode position and alignment.

Remote-Controlled Electrode Clamps.

This device, of the spring-clamp, air-release type, is located inside of the rear section of the water-cooled mast arm where heat cannot affect it.

Square-Sectioned Electrode Mast.

This design feature, developed by American Bridge, assures proper guiding and electrode positioning.

Rockers.

The heavy fabricated steel curved top and bottom rockers minimize forward travel during tilting. The furnace will return to charge position from any degree of tilt due to designed center of gravity.

USS and Heroult are registered trademarks

American Bridge Division of USS United States Steel

General Offices: 525 William Penn Place, Pittsburgh, Pa. • Contracting Offices in: New York, Philadelphia, Chicago, San Francisco, and other principal cities.
United States Steel Export Company, New York

7′ dia., 1½–ton Heroult in a leading midwest foundry.

Should You Put in an Electric?
Our 32-Page Catalog
Tells You Where and When!

Send for our free Heroult catalog for comprehensive information on the advantages of electric melting. Contains charts and tables; gives sizes, capacities, and ratings. Helps you determine how the Heroult can improve your operation. Just contact the nearest office or write direct to Pittsburgh.

Circle 575 on Page 51

American Bridge Division
525 William Penn Place, Dept. F-118
Pittsburgh 30, Pa.

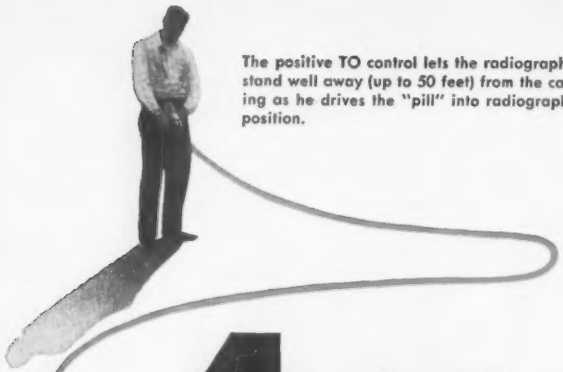
Please send me a copy of the latest Heroult Electric Furnace catalog ☐ and/or folder showing large drawing with special installation and engineering data ☐.

Name ..... **Title** .....

Firm Name .....

Address .....

City ..... **State** .....

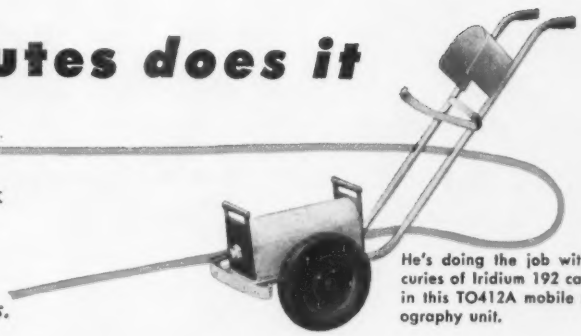


The positive TO control lets the radiographer stand well away (up to 50 feet) from the casting as he drives the "pill" into radiographic position.

4 minutes *does it*

The man up there radiographing that 2" thick steel casting down there will have the job done in four minutes.

That's how fast modern gamma radiography is.



He's doing the job with 50 curies of Iridium 192 carried in this TO412A mobile radiography unit.

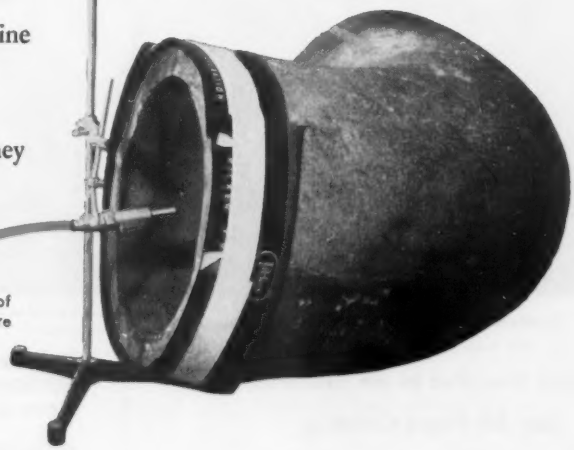
The isotope he's using (Iridium 192) will give him 2% sensitivity, too. Matter of fact, you can easily get 2% sensitivity in sections up to 6" of steel, brass, copper, bronze . . . even *lead* . . . when you match the isotope to the job.

Makes no difference what you *make* or *buy* or *sell* (plastics, light metals, fabricated parts, assemblies—the list is endless) if it needs radiographic "seeing into" for quality control, we have the machine (gamma or x-ray) to do it most efficiently.

If *you are* confronted by an inspection problem why not let our consulting radiographers see what they can do for you? It will cost you nothing, may save you a lot. Call your local Picker* representative or write us outlining the situation.

Picker x-ray

25 South Broadway, White Plains, N. Y.



One "shot" radiographs the entire girth of the casting. Picker Flexible Film Holders are quickly taped on, quickly removed.

**There's probably a Picker district office near you (see your local 'phone book).*

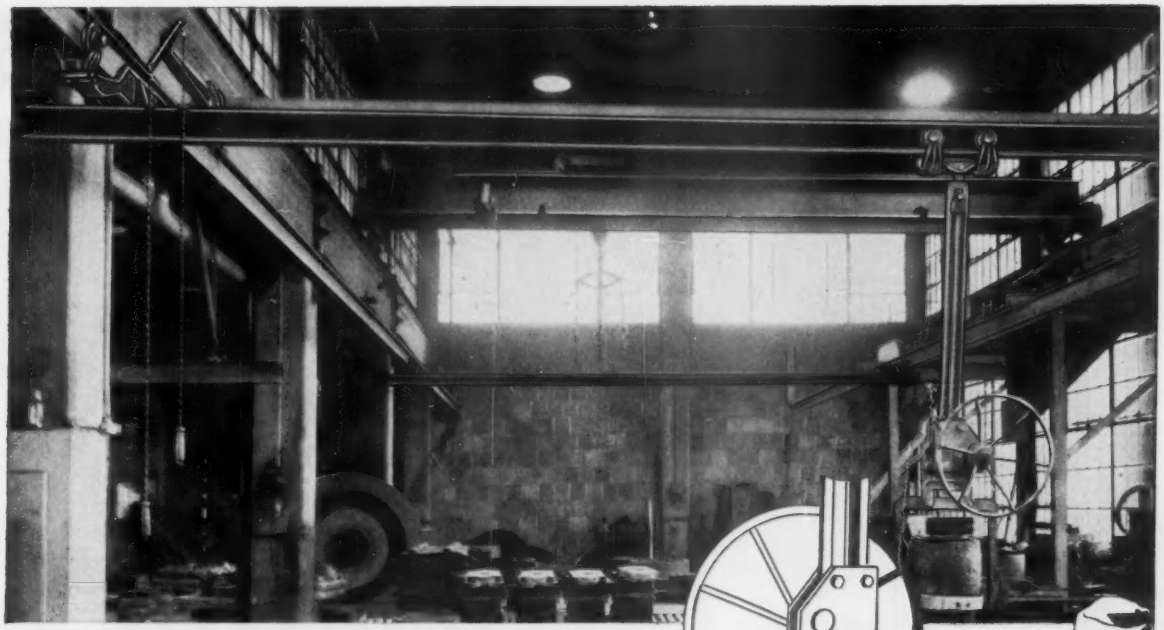
PICKER . . . one stop for everything in industrial fluoroscopy and radiography

ANDREX lightweight portable x-ray units—130 KV, 160 KV, 200 KV, 260 KV and *Andrescope* X-ray Stress Analyzer.

PICKER x-ray units—5 to 50 KV, 150 KV (stationary and mobile), 270 KV portable, 260 KV heavy-duty, x-ray diffraction apparatus, rayproof inspection cabinets.

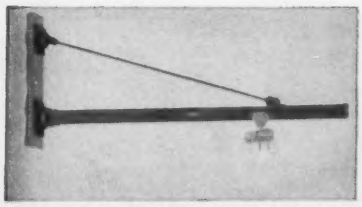
ACCESSORIES . . . films, tanks, darkroom sundries, illuminators, *everything*.

TECHNICAL OPERATIONS units for isotope radiography—sources, equipment, containers for Iridium 192 Cesium 137 Cobalt 60 and Thulium 170.

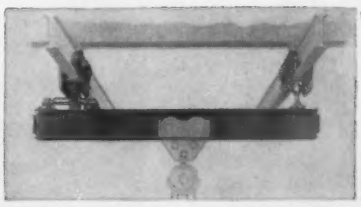


Reduce handling costs with . . . R-W CRANE and "TRU-TRED" MONORAIL SYSTEMS

Modern foundries have found that they can now efficiently and safely cut costs, and speed-up production by installing R-W Cranes and Monorail Conveyor systems. Whether you need a single unit for a specific operation or a complete system, R-W Cranes and Monorail Conveyors combine ladle handling with maximum smoothness and safety, plus 100% utilization of pouring floor area. Transfer crane with safety interlocks at transfer points provide flexibility and easy handling throughout pouring operations. R-W Cranes and Monorail systems are available in a size to efficiently and economically meet your specific requirements.



R-W 939 Swinging Jib Crane . . . available in a wide variety of sizes and capacities up to 4000 lbs. . . . Furnished with rod support. R-W 968 Jib Crane has curved track to support the outer end of boom.



R-W 971 Flexible Traveling Crane . . . self adjusting yoke and cross head . . . will not bind as bridge need not maintain right angles to tracks. Available in variety of sizes and capacities up to 8000 lbs. Not applicable as a transfer crane.

Why not let an R-W Sales-Engineer show you, without cost or obligation, how R-W equipment can effect remarkable savings for you in time, money and maintenance. Write today for complete information.

Richards-Wilcox
MANUFACTURING COMPANY
"MATERIAL HANDLING DIVISION"

466 W. THIRD STREET, AURORA, ILLINOIS • Branches in Principal Cities

Circle 577 on Page 51

PRODUCTO

Quality Die Sets

In the production of die sets, the pig iron portion of the charge consists of equal parts of Chateaugay Pig Iron and Republic Malleable Pig Iron. Republic, as the only producer of both Northern and Southern Irons, offers industry's most complete line of all grades of merchant pig iron. In addition to Chateaugay and Malleable, Northern grades include Bessemer, Foundry, and Basic. Southern furnaces produce Foundry and Basic Irons.

This 6-ton die set used in heavy automotive stamping is but one of the many types and sizes produced by The Producto Machine Company using Republic Chateaugay and Malleable Pig Irons.

Start with Republic Pig Irons

The Producto Machine Company, Bridgeport, Connecticut, combines skill and modern foundry equipment with the finest raw materials to produce the highest quality die sets for the metal stamping industry.

Producto casts die set parts in their own foundry, using only raw materials with a definite known analysis, including Republic Pig Irons and ARA rail quality scrap. Republic Chateaugay and Malleable Pig Irons' year-in, year-out uniform chemistry help Producto produce high quality, laboratory-controlled castings. The company has found that there is no better, no more economical means for insuring strong, flaw-free, easy-to-machine castings.

Chateaugay's uniform distribution of chemical elements produces a dense grain structure which results in economical machining—plus excellent wear-resistance. Loss rate caused by flaws and porosity is held to an absolute minimum.

Other characteristics of Chateaugay are unequalled by any domestic pig iron. Its high carbon and unusually low sulphur, phosphorus, and manganese content make it ideally suited for production of ductile iron castings.

A Republic Pig Iron Metallurgist will give you all the facts on Chateaugay and Malleable Pig Irons for quality castings as well as complete details on other Republic Irons.

Send the coupon today for prompt, expert metallurgical service, or for more information on Republic's complete line of irons.

THIS STEEL "HOT" BOX MEETS ALL REQUIREMENTS for handling hot work in foundries. It is made of Republic High Strength Steel and is designed to withstand plenty of use and abuse. The box is 53" long x 38" wide x 26" deep. Corrugated-steel construction of the sides and bottom assures long service life at lowest per-year-cost. Stacking brackets are securely welded to the top corners of each box permitting tiering to any practical height. 16-inch clearance is provided for easy handling by fork lift truck. Send coupon for catalog on the complete line of Republic Materials Handling Equipment.

STRENGTH TO WITHSTAND ENORMOUS WEIGHTS—Republic Wedge-Lock Steel Shelving is specifically designed for high stacking of such heavy items as dies, patterns, castings, etc. Joints actually grow tighter as weight increases. There's no distortion or instability. Result is efficient use of floor space plus easy rearrangement to meet future needs.

STRONG, STURDY, RIGID Republic Steel Lockers combine smart styling and design with simple construction for fast, easy installation. Tough, Bonderized steel base guards against underfinish corrosion that causes flaking and peeling. Give employee morale a boost with handsome Republic Industrial Lockers. Write for illustrated booklet on types, prices, specifications.

REPUBLIC STEEL

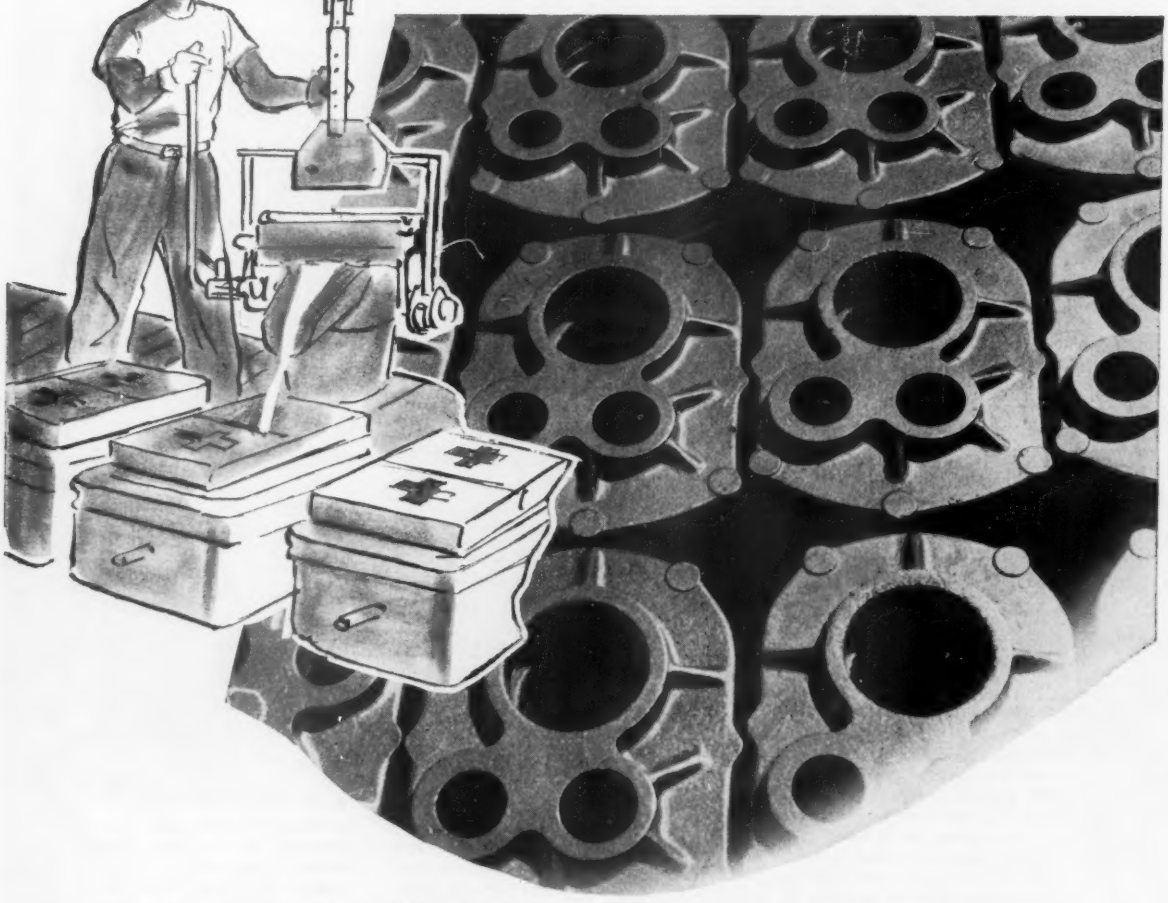
World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. FO-6485
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

☐ Have a Pig Iron Metallurgist call.
Send more information on:
☐ Shelving
☐ Materials Handling Equipment ☐ Lockers

Name_____ Title_____
Company_____
Address_____
City_____ Zone___ State_____

CONSISTENT QUALITY . . .
Not Perfection



Pays Off for Both Foundryman and User

● Absolute *perfection* in castings is usually a pointless aim. It is also expensive and seldom necessary.

It is *consistent* quality that designers and engineers need, with the 10,000th casting as useful as the first. For any selected level of service requirements, you set the standard and hold to it. This is profitable and builds acceptance for castings.

Cooperation between the foundryman and user of castings can develop good design. Castings that are lighter, stronger and cheaper can usually be produced.

With Magnaflux' fast, low-cost non-destructive inspection methods, *all* cracks in any metal can be found and evaluated. Many cracks are unimportant, while some will call for corrective action. You thus can eliminate the needless scrapping of *good* castings for *seeming* defects that have no effect on service. Causes of any really serious defects can be corrected. Magnaflux, Magnaglo, Zyglo and Stresscoat are profitable tools in the foundry.

To insure consistent, reliable castings, once right procedures have been established, only a sampling "finger-on-the-pulse" inspection is normally required.

● Ask to Have a Magnaflux Engineer Give You All the Facts—Soon

MAGNAFLUX CORPORATION

7350 West Lawrence Avenue • Chicago 31, Illinois
New York 36 • Pittsburgh 36 • Cleveland 15
Detroit 11 • Dallas 35 • Los Angeles 22

Circle 579 on Page 51

Late News

TO PUSH MALLEABLE: The Malleable Castings Council, a new organization formed by approximately 40 malleable iron foundries, plans an extensive campaign to promote the use of malleable castings. An advertising budget of about $200,000 has been established for the first year's operations. The advertising campaign will be focused on design engineers, specifiers of metals, and production and general executives in the metalworking and original equipment markets.

Robert J. LaMarche, American Malleable Castings Co., Marion, Ohio, is president of the council. Other officers: Vice president, Charles A. Schneider, National Malleable & Steel Castings Co., Cleveland; secretary, Gardner Van Duyne, Meeker Foundry Co., Newark, N. J; treasurer, James T. Dougherty, Canton Malleable Iron Co., Canton, Ohio.

MFS TECH DIRECTOR: Hans J. Heine has been appointed technical director of the Malleable Founders' Society, Cleveland, effective Nov. 3. Mr. Heine recently has been technical director of the Publication Development Div., American Society for Metals, and previously was technical director, American Foundrymen's Society.

BOUGHT: Headford Bros. & Hitchens Foundry Co., Waterloo, Iowa, has bought and is operating Modern Castings Corp., Waterloo, as a wholly owned subsidiary. Headford is a gray iron foundry, and Modern produces brass, bronze, and aluminum castings.

SOLD: Harsch-Ebaloy Foundries Co. has sold its Cleveland foundry and by next Jan. 1 will transfer operations to its Rockford, Ill., plant. Prior to last year the Harsch property was a division of Ferro Machine & Foundry Inc., Cleveland, which acquired the bronze and aluminum foundry in 1952.

MOVES: Saco-Lowell Shops plans to expand its textile machine operations at its plant near Easley, S. C., following closing of its Biddeford, Maine, plant, including a gray iron foundry. It is expected to obtain most of its castings from Draper Corp., Hopedale, Mass., which also operates a foundry at East Spartanburg, S. C. Draper reportedly will enlarge its southern capacity to handle the additional work.

FEMA ELECTS: Gordon E. Seavoy, vice president, Whiting Corp., was re-elected president, Foundry Equipment Manufacturers Association, at its recent annual meeting. Einar A. Borch, vice president, National Metal Abrasive Co., was named first vice president, and Richard A. Brackett, executive vice president, Spencer Turbine Co., second vice president. C. R. Heller continues as secretary-treasurer.

GRAY IRON MERGER: Superior Foundry Inc. has acquired Allyne-Ryan Foundry Co. The two Cleveland producers of gray iron castings will operate under the name of Superior Foundry Inc. with Allyne-Ryan as a division. Combined gray iron production capacity of the two foundries is in excess of 2500 tons monthly. Walter L. Seelbach is president of Superior. Frank Feltes, Allyne-Ryan president, will be active under the new setup.

ACQUIRES FOUNDRIES: Gould-National Batteries Inc., St. Paul, has acquired several companies which operate foundries. They include White Machine Works Inc., Eau Claire, Wis., and its subsidiary, Liberty Foundries Co., Rockford, Ill.; Gillett & Eaton Inc., Lake City, Minn., and its subsidiary, Arrow Head Steel Products Co., Howell, Mich.

PERSONALS: Albert P. Gagnebin has been elected a vice president and Joseph M. Weldon an assistant vice president, International Nickel Co. . . . Gordon C. Curry has been appointed vice president in charge of sales, Dollin Corp., Irvington, N. J. . . . James L. Payne has been elected vice president in charge of sales, Ross-Meehan Foundries, Chattanooga, Tenn. . . . Samuel W. Gearhart Jr., recently metallurgical consultant and sales engineer, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has been made chief

metallurgist . . . George L. Teller has been appointed purchasing agent, foundry products and supplies, Allis-Chalmers Mfg. Co., Milwaukee . . . Stuart F. Cooper, formerly manager, advertising and sales promotion, has been named sales manager of castings, Cooper Alloy Corp., Hillside, N. J. . . . Norman F. Garrett has been elected vice president and general manager for manufacturing, Crane Co., Chicago.

OBITUARY: Frank W. Wabiszewski, 66, executive vice president, Maynard Electric Steel Casting Co., Milwaukee, died Oct. 18 . . . Robert W. Nelson, 48, vice president, American Air Filter Co., Louisville, died Oct. 9 . . . Leon E. Koleman, 67, factory superintendent, Fremont Flask Co., Fremont, Ohio, died Oct. 18.

LIFTS IMPORT BAN: Britain has lifted import restrictions on a wide range of industrial and other types of machinery shipped from the dollar area and Western Europe. The list of freed goods which now may be imported includes foundry machinery and equipment.

ALUMINUM ENGINES: The latest rumor on approaching use of aluminum engines in American-made automobiles is that Chrysler Corp. has placed orders for dies to make die-cast aluminum parts for a six-cylinder engine. It has been surmised that Chrysler has been working on a light car program for some time but that the company is about a year behind Ford and General Motors.

MISCELLANY: Acme Foundry Corp., Cleveland producer of gray iron castings, has discontinued operations . . . Castings have been added to the line of titanium products produced by Harvey Aluminum at its Torrance, Calif., plant . . . Foundry Services Inc., Columbus, Ohio, plans to move its manufacturing facilities, offices, and laboratories early next year to a new plant in Brook Park Village, a Cleveland suburb . . . The Supreme Court has refused to reinstate a government anti-trust suit charging five steel foundries and the Association of American Railroads with conspiring illegally to monopolize the manufacture of car couplers . . . September production of primary aluminum was 124,713 tons, against 125,416 in August and 129,277 a year ago, the Aluminum Association reports . . . Union Carbide Corp. plans to change the name of the Bakelite Co. to Union Carbide Plastics Co.

Prices of Foundry Metals and Coke

(As of Oct. 27, 1958)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$18.00-18.50
OVEN	
Birmingham	$28.85
Buffalo	30.50
Detroit	30.50
Erie, Pa.	30.50
Indianapolis	29.75
Kearny, N. J.	29.75
Milwaukee	30.50
Montreal, Que.	31.00
Neville Island (Pittsburgh)	29.25
New England, deld.	31.55
Painesville, O.	30.50
Philadelphia	29.50
St. Louis	31.50
St. Paul	29.75
Swedeland, Pa.	29.50
Terre Haute, Ind.	29.75

PIG IRON

(Per Gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	67.00	67.50
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	68.00	68.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 29.00; tin bronze, No. 225, 38.00; No. 245, 32.75; High-leaded tin bronze, No. 305, 33.25; No. 1 yellow, No. 405, 24.00; manganese bronze, No. 421, 25.75.

ALUMINUM: 99 per cent plus primary ingots 26.80. Secondary No. 12 alloy, 21.50-22.00. Deoxidizing grades: No. 1, 22.75; No. 4, 18.00.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 27.50, delivered Connecticut valley.

ZINC: High grade 12.00, delivered. Die casting alloy No. 3, 13.50; No. 2, 13.75, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$39.00–40.00	$54.00–55.00	....	....	....	....	$52.00–53.00
Boston*	**29.00–30.00	**33.00–34.00	....	....	**36.00–38.00	....	....
Buffalo	35.00–36.00	**44.00–45.00	....	....	**48.00–49.00	....	57.00–58.00
Chicago	43.00–45.00	45.00–46.00	....	51.00–52.00	51.00–52.00	55.00–56.00	58.00–60.00
Cincinnati*	**37.50–38.50	**43.00–44.00	**36.00–37.00	....	**47.00–48.00	....	**55.00–56.00
Cleveland	39.50–40.50	44.00–45.00	36.00–37.00	49.00–50.00	49.00–50.00	60.00–61.00	57.00–59.00
Detroit*	**32.00–33.00	**42.00–43.00	**34.00–35.00	**44.00–45.00	....	....	....
Los Angeles	32.00	**39.00	....	....	....	....	....
New York*	32.00–33.00	36.00–37.00	33.00–34.00	....	....	....	....
Philadelphia	41.00	41.00	43.00	....	49.00–50.00	58.00	58.00–60.00
Pittsburgh	43.00–44.00	44.00–45.00	....	39.00–40.00	51.00–52.00	....	57.00–59.00
St. Louis*	37.00	49.00	38.00	49.00	....	....	52.00
San Francisco	32.00	44.00	28.00	40.00	48.00	....	....
Seattle	30.00	31.00	28.00	....	....	....	....

*Brokers' buying prices. **F.o.b. shipping point

WHITEHEAD'S
MOISTURE CONTROLLED
NATURAL BONDED
DORCHESTER MOLDING SANDS AND GRAVELS

Guaranteed Moisture Content Not More Than 6%

LEADER IN FOUNDRY SANDS SINCE 1841

These natural bonded sands and gravels are widely used for Molds and Cores in Iron, Steel, Alloy, and Non-Ferrous Castings. They are noted for colloidal clay giving high green and dry strength. Because of low fines in the grain distribution, these sands have high permeability. Here are advantages you may expect from Whitehead's Naturally Bonded Moisture Controlled Dorchester Sands and Gravels.

1 ***Moisture Controlled Sands Do Not Freeze—***

a. Easier to unload . . . means lower unloading costs.
b. Reduces handling costs to and from storage bins.

2 ***Moisture Controlled Sands Are Economical—***

a. Sands with 15% moisture have 1700 lbs. sand and 300 lbs. water in each ton.
b. Moisture Controlled Sands with 6% moisture have 1880 lbs. sand and 120 lbs. water in each ton.
c. On each ton of Moisture Controlled Sands you *SAVE price of sand and freight on 180 lbs. of water.* Sand has just proper amount of moisture to eliminate dust hazard.

3 ***Ready for Use on Arrival at Foundry—***

a. Dorchester Moisture Controlled Sands and Gravels arrive with proper working moisture content so that they can be used at once.
b. Aids you in control of sands in foundry.

Whitehead Brothers
COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
75 Westminster St., Providence 1, R. I.

Manufacturers of:

LYQUAGRIP
Ready-to-use core paste

DOS-IT
Ready-to-use core mudding compound

JOINT-SEAL
Plastic compound for perfect sealing

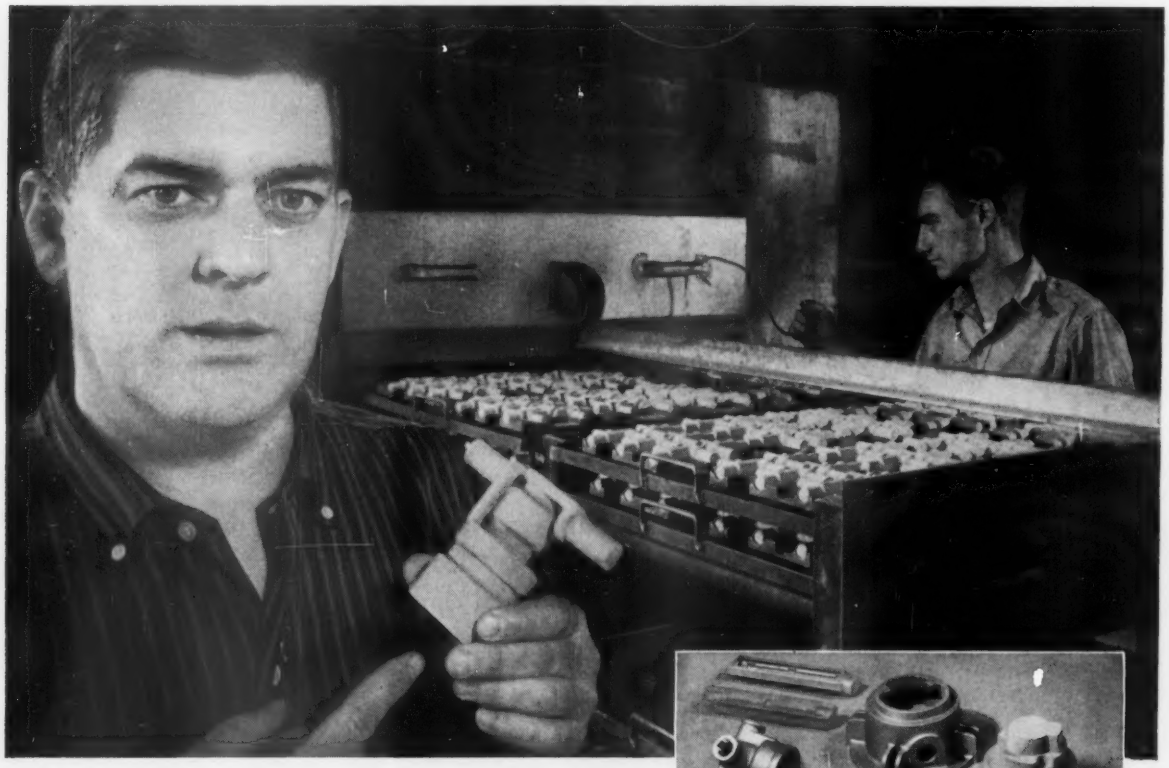
LYQUAFLOUR
For cleaner surface, better shakeout

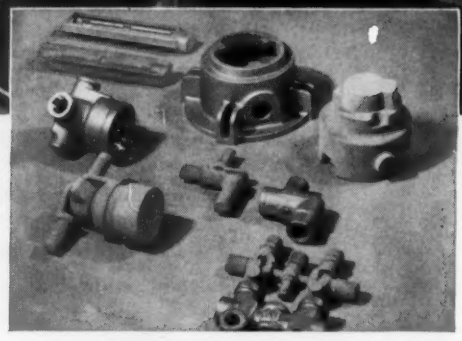
LYQUAFACE
The liquid sand grain coating

Circle 580 on Page 51

Production Foundry Reports:

Amazing Results with NEW Fume-Free...





FOUNDREZ 7605 BINDER

...no smoke, drying cycle cut in half!

"Our use of FOUNDREZ 7605 *has been extremely profitable for us. Its fume-free property alone would justify its use... having solved a serious employee turnover problem."* This statement is made by Mr. William E. Virgin, factory superintendent of Samuel Eastman Company, Inc., Concord, New Hampshire.

But that's not all Mr. Virgin has to say about this Reichhold amino-aldehyde thermosetting core binder!

"In addition, by converting to FOUNDREZ 7605, *we increased our oven capacity by 75%, cut back our curing cycle by 50%, stepped up production per man-hour in the core department by 20%, reduced maintenance work on core-making equipment, reduced fuel oil cost and eliminated 85% of casting scrap caused by blows."*

You can duplicate the savings made by the Samuel Eastman Company, which has been a manufacturer of fire fighting equipment since 1824. Use RCI FOUNDREZ 7605 for core binding. Reichhold will deliver this unique liquid resin to you in tank cars, tank trucks or drums.

Write to RCI for *Technical Bulletin F-8* which gives full data on FOUNDREZ 7605.

REICHHOLD CHEMICALS, INC.,
RCI BUILDING, WHITE PLAINS, N.Y.

REICHHOLD
FOUNDRY PRODUCTS

FOUNDREZ—Synthetic Resin Binders
COROVIT—Self-curing Binders
coRCIment—Core Oils

Creative Chemistry... Your Partner in Progress RCI

Circle 581 on Page 51

THE "KWIK FILL" FOR BIG FLASKS

NEWAYGO'S DOUBLE ARM PIVOTED FLASK FILLER

STEEL CASTINGS
for main pedestal and knuckle joint

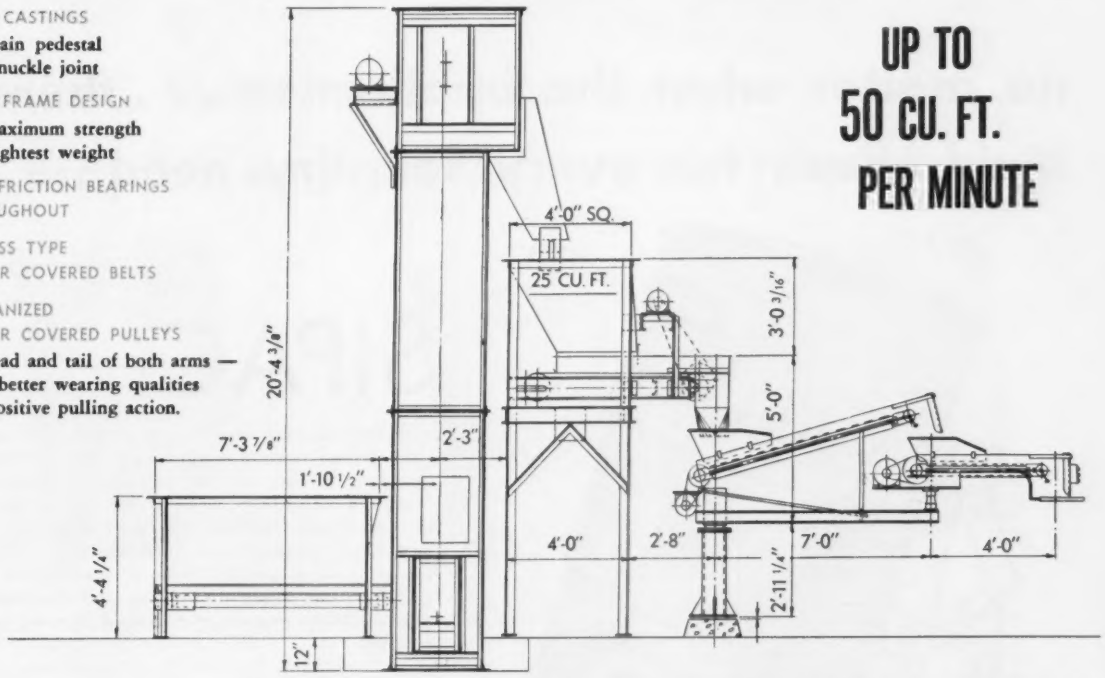
STEEL FRAME DESIGN
for maximum strength and lightest weight

ANTI FRICTION BEARINGS THROUGHOUT

ENDLESS TYPE RUBBER COVERED BELTS

VULCANIZED RUBBER COVERED PULLEYS
for head and tail of both arms — gives better wearing qualities and positive pulling action.

UP TO 50 CU. FT. PER MINUTE

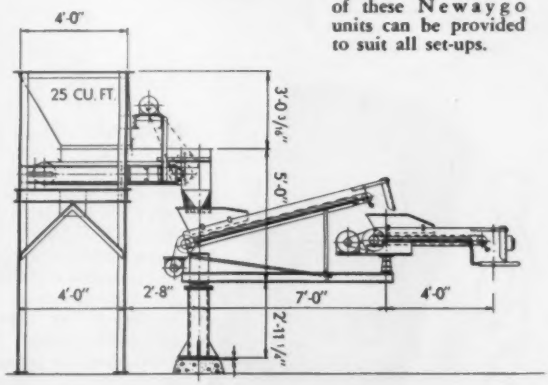


The typical foundry set-up above incorporates the new model EHS Handy Sandy or the Super Handy Sandy in conjunction with prepared sand storage and Pivoted Flask Filler. Capacity of sand to storage is up to 35 tons per hour. The Pivoted Flask Filler has a capacity up to 50 cu. ft. per minute as needed. The filler arms are extremely well balanced for easy operation. They offer a working flexibility that permits several large flasks to be filled in an area at one time without moving the flasks. Cope and drag filling can also be handled on a pair of large molding machines or jolt tables spaced within a reasonable distance of each other.

Unit shown above has a 7 ft. primary arm and a 4 ft. secondary arm which allows flasks ranging from 3x17 ft. to 6x10 ft. or smaller to be easily filled. A 5 ft. long secondary arm will be available in the near future allowing an even greater filling area.

The illustration below is the same basic unit as above, except the prepared sand storage hopper is filled by an overhead crane or other existing sand conveying or elevating equipment.

Special arrangements of these Newaygo units can be provided to suit all set-ups.



"Foundry Business is BIG Business"

NEWAYGO engineering company
NEWAYGO, MICHIGAN

. . and profitable too, with NEWAY® MOLD HANDLING, SAND HANDLING AND CONDITIONING EQUIPMENT

Circle 582 on Page 51

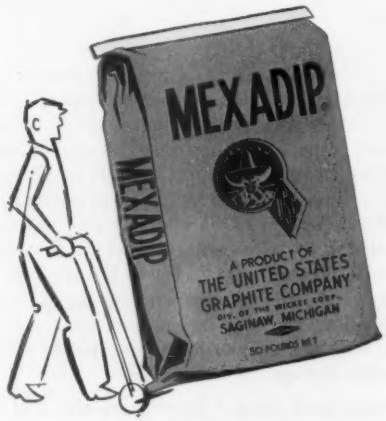
WASHES · WAS

no matter what the application . . . there is Mold Wash for every foundry need . . . or

SIPAC®

with only the addition of water, produces a bright, gold-colored coating with fine, smooth surfaces, using any foundry sand. It's non-carbonaceous and inert and will not react with any molten metal, including grey iron and steel. Resists flaking and completely protects core surfaces. You get improved casting quality. Sipac is available in 55 gallon drums, ready for mixing and dilution to desired Baume — even to a scale of 32 — without settling.

MEXICAN® VV FLAKE ("volatile vehicle") — meets the growing demand for good mold and core wash suited to carbon dioxide mold-core hardening process. Completely compatible with isopropyl alcohol, oleum spirits, kerosene or similar agents, Mexican VV Flake provides extra refractory protection . . . improves skin hardness . . . gives better casting quality. Comes in paste form, suitable for application by spraying or dipping.



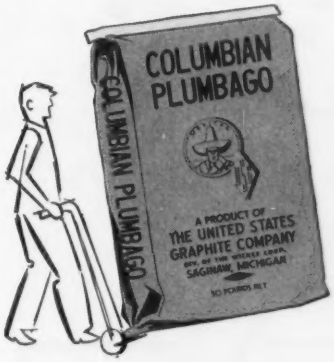
MEXADIP® — refractory core coating containing its own binder, requires only water to prepare it for use. Will not ferment, produces a very uniform, even coating over entire core with practically no sagging, running or dripping. Use it throughout foundry for green or baked cores, ferrous or nonferrous foundry practice.

THE UNITED STATES

GRAPHITAR® CARBON-GRAPHITE • **GRAMIX®** POWDERED METAL PARTS • **MEXICAN®** GRAPHITE PRODUCTS • **USG®** BRUSHES

HES · WASHES

a United States Graphite Company Core or one may be engineered to your requirement



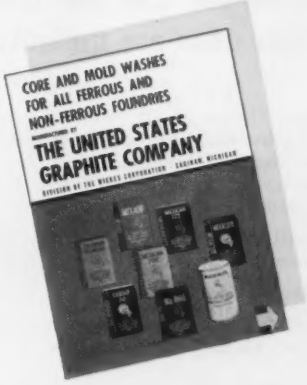
MEXICAN® COLUMBIAN PLUMBAGO— versatile wet blacking used for loam work, green or dry sand or torch dried molds where soft coat with high resistance is required. Suitable for all types of castings, including those of over 25 tons, high steel mixtures and castings poured at high temperatures.

SLICK RITE®— compounded from a base of high quality flake graphite to produce best slicking qualities, Slick Rite is applied to green sand molds by hand rubbing, tooling or brushing. Excellent casting quality obtained when mixed with water and molasses to produce wet lead for spraying molds and cores.

MEXICAN® 172—high refractory wet blacking with binder. For application to both molds and cores of heavy sectioned castings where best possible finish is required under severe pouring conditions.

No. 866®—is a wet blacking without binder. Provides soft coating with good refractory properties for molds and cores of medium and light sectioned castings. Also makes good blacking for bell end cores in pressure pipe manufacture. Can be applied by spraying, brushing or swabbing at 40-45 Baume.

MEXICAN® 700 — is particularly suitable for large molds and dry sand cores of high carbon iron such as cast iron rolls and ingot mold castings poured at intermediate temperatures. Contains no binder.



Write today for engineering bulletin No. 17 giving complete details and application methods of core and mold washes for all ferrous and nonferrous foundries.

GF-244-2

GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

PROPOSALS SOLICITED FOR LEASE OF DEPARTMENT OF THE ARMY INDUSTRIAL FACILITIES

All or portions of the above installations are available for use for commercial purposes. Possible uses are unlimited.

Facilities: Oleum plants (sulphuric acid); nitric acid; acid concentration; ether still; nitrocellulose; various explosive manufacturing; organic chemical manufacturing; steel foundries; heavy and light manufacturing; loading and assembling; offices; warehouses; power plants; storage tanks; many other facilities.

Transportation: Rail and highway facilities are available to these installations, including intra-plant rail and road systems.

Utilities: All necessary utilities are available.

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Detailed information, arrangements for inspections, invitations for proposals and sample form of lease may be obtained from the U. S. Army Division Engineer having jurisdiction over the area in which you are interested. The addresses of the Divisions Engineers are:

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SOUTH ATLANTIC
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SOUTH PACIFIC
PO Box 3339
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San Francisco, Calif.

SOUTHWESTERN: 1114 Commerce St., Dallas, Texas

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2. Iowa Ordnance Plant, Burlington, Iowa
3. Kansas Ordnance Plant, Parsons, Kansas
4. Lake City Arsenal, Independence, Mo.
5. Nebraska Ordnance Plant, Wahoo, Nebr.
6. Rocky Mountain Arsenal, Denver, Col.
7. St. Louis Ordnance Plant, St. Louis, Mo.
8. St. Louis Ordnance Steel Foundry, St. Louis, Mo.
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NORTH ATLANTIC
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2. Burlington Ordnance Plant, Burlington, N. J.
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4. Ordnance Assembly Plant, Edgewood, Md.
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NORTH CENTRAL
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3. Joliet Arsenal, Joliet, Ill.
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6. Wabash River Ordnance Works, Newport, Ind.

OHIO RIVER
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2. Indiana Arsenal, Charlestown, Ind.
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4. Lima Ordnance Steel Foundry, Lima, Ohio
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CORPS OF ENGINEERS, U.S. ARMY

Circle 583 on Page 51

Circle 584 on Page 51→

Pay less for more strength! Tenzaloy the self-aging aluminum alloy needs no heat treatment! If your aluminum castings are too large or too intricate for heat treatment, if your heat treating facilities are limited, if you need superior strength than you get from ordinary heat-treated alloy demand "Federated Tenzaloy" developed by Federated to meet the need for a superior aluminum alloy that ages at room temperature. Tenzaloy eliminates rejects due to warpage, expansion, and internal stresses caused by quenching. Tenzaloy finished properties are stable, proved by conclusive test data over a ten year period. No special foundry techniques are required. No fluxes. Castability is excellent with sand cast and plaster molds and many permanent molds. Tenzaloy will not "grow," produces corrosion-resistant castings with excellent polishing characteristics and anodizes clear white. Write for Tenzaloy Bulletin No. 103. Federated Metals Division, 120 Broadway, New York 5. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal.

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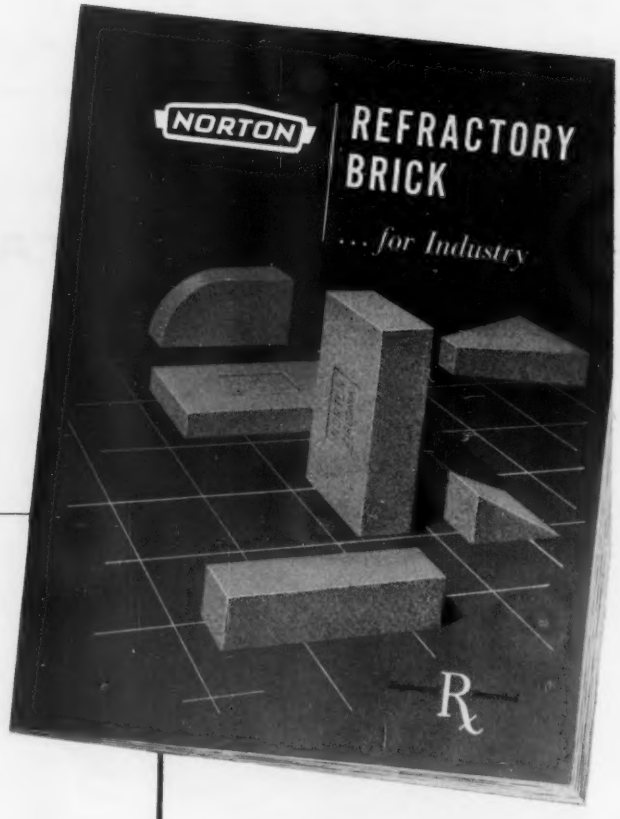
AMERICAN SMELTING AND REFINING COMPANY

TENZALOY is one of a complete series of Federated aluminum casting alloys. A new plant in Alton, Ill. will soon be in production to satisfy the requirements for Tenzaloy in the mid-west.

58-28

Send for this

New Booklet to Help Improve Your High Temperature Processing



Covers Norton refractory brick applications, characteristics, chemical analyses — includes helpful data on materials of construction for temperatures up to 4,400°F.

This new, 24-page Norton booklet can be a dependable guidebook for your selection of the refractories you need to improve production and cut costs in high temperature processing.

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All essential details are listed, such as: how each material is produced . . . important properties, characteristics and chemical analyses . . . shapes of brick and other molded products that are available . . . representative applications . . . packing methods that assure safe arrival.

Also included are charts and tables of brick shapes and sizes, thermal expansion and conductivity graphs, and a temperature conversion chart.

Norton refractories — engineered and prescribed for the widest range of applications — have helped many users save time and money. The ℞'s described in "*Norton Refractory Brick . . . for Industry*" may do the same for you. Write for your copy to NORTON COMPANY, Refractories Division, 310 New Bond Street, Worcester 6, Massachusetts.

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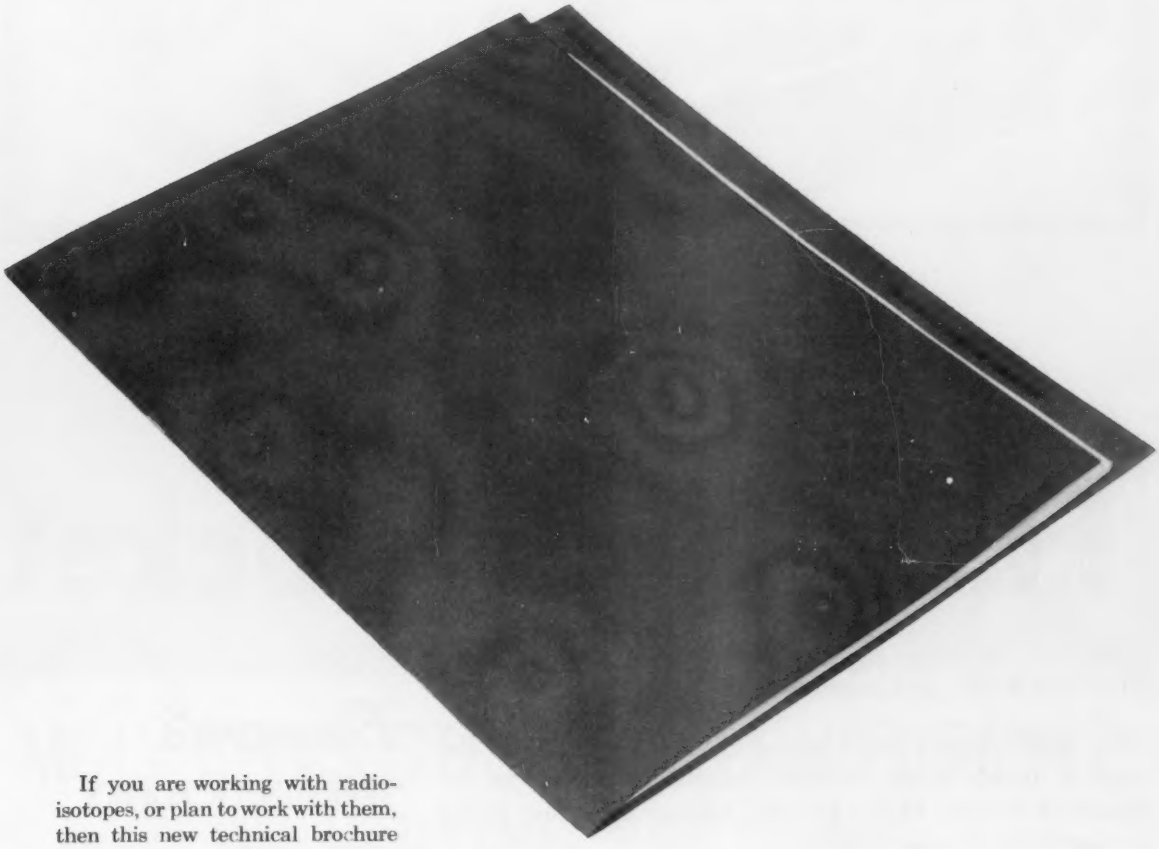
the whole story in a nutshell in Ansco's free new

"RADIOISOTOPES IN INDUSTRY"



If you are working with radioisotopes, or plan to work with them, then this new technical brochure is a must for your files.

It gives needed facts and figures on the use of major radioisotopes . . . explains in detail half-life, intensity, energy . . . and, describes how each of these characteristics affect exposure time and radiographic quality. It also presents basic exposure factors and compares the quality of radiographs made by exposure to x-rays and gamma rays.

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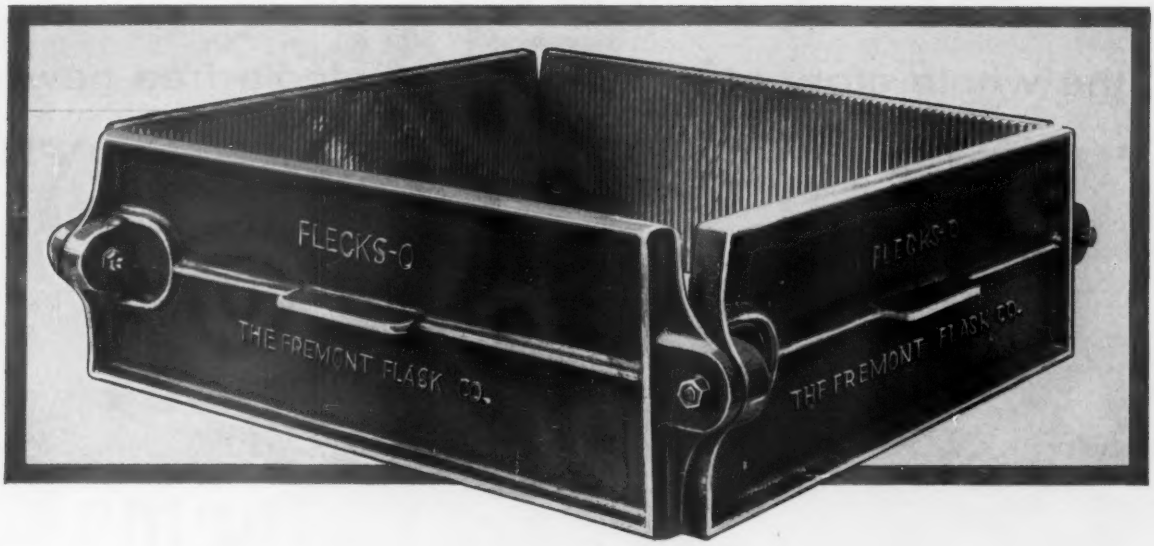
Circle 586 on Page 51



Fremont's

"FLECKS-O" Jacket

This new flexible JACKET has been developed to eliminate shifts and runouts.

The "FLECKS-O" will automatically line up with the sides of molds made in flasks assembled on any of the standard tapers. These JACKETS are available either in cast iron or cast aluminum.

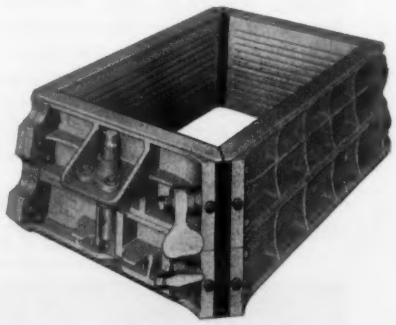
The "FLECKS-O" is assembled from 4 castings, so if you have the misfortune to break one of them, you need not scrap the entire JACKET. Completely machined and drilled replacement castings can be furnished at a nominal cost. These can be installed simply by removing 2 nuts.

THE FREMONT "FLECKS-O" JACKET IS AVAILABLE IN STANDARD 4½", 6", 7½", 9" AND 10" DEPTHS. WRITE US FOR PRICES.

Fremont's

SPREADLOCK FLASKS

have tremendous corner strength. They are made of magnesium, with cams of hardened steel forgings. Accurately machined to assure exacting work.



THE FREMONT FLASK CO.

FREMONT, OHIO

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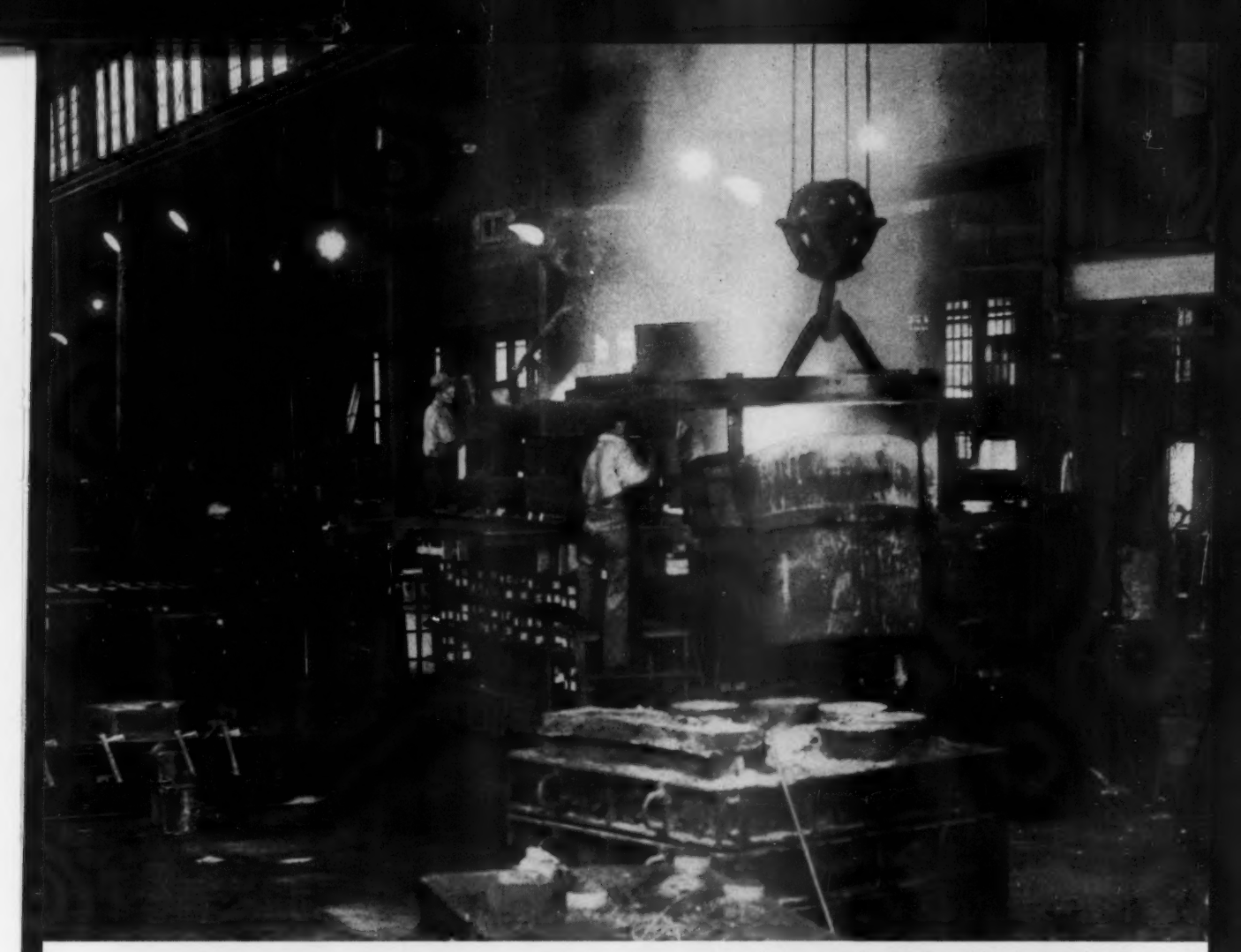

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MOLY GIVES STRENGTH+UNIFORMITY IN VARYING SECTIONS

50 points of moly = 7000 psi

Ladle additions of moly are the most practical way of increasing the strength of gray iron to meet modern specifications. Therefore, you can quote on inquiries calling for strengths 10,000 or 15,000 psi over your regular base iron.

Moly also gives uniformity, so you can get uniform properties with the same iron in different castings with widely varying mass and section, as well as in a casting incorporating both light and heavy sections.

Foundrymen like moly because it is reliable, easy to use and does not require changes in their base iron.

Get full details. Send for "Why Moly Iron," a series of practical bulletins that explain how moly makes better iron castings. Or ask our foundry representatives to call. Write: Climax Molybdenum Company, a Division of American Metal Climax, Inc., 500 Fifth Avenue, New York 36, N. Y.

CLIMAX MOLYBDENUM

Circle 588 on Page 51

Ultimately, *somebody* has to get rid of "plant" dust, dirt, smoke and fumes. If the job is left up to workers, the cost to management is exorbitant. For example, if workers' cars are constantly exposed to blankets of dust in the Company parking lot, lowered morale and complaints are the inevitable result.

The modern (and thrifty) way to attack the problem is with AAF Dust Control applied at all dust sources. This way, dust is trapped the instant it is produced. It never has a chance to irritate workers, arouse neighborhood housewives or run up your own plant cleaning costs.

For complete information on AAF's complete line of dust control equipment, write for "The Answers to the Five Basic Dust Problems" (Bulletin 270-A1). Address: Mr. Robert Moore, American Air Filter Co., Inc., 266 Central Ave., Louisville 8, Ky. In Canada: American Air Filter of Canada, Ltd., 400 Stinson Blvd., Montreal 9.

AAF **American Air Filter**
COMPANY, INC., LOUISVILLE, KENTUCKY

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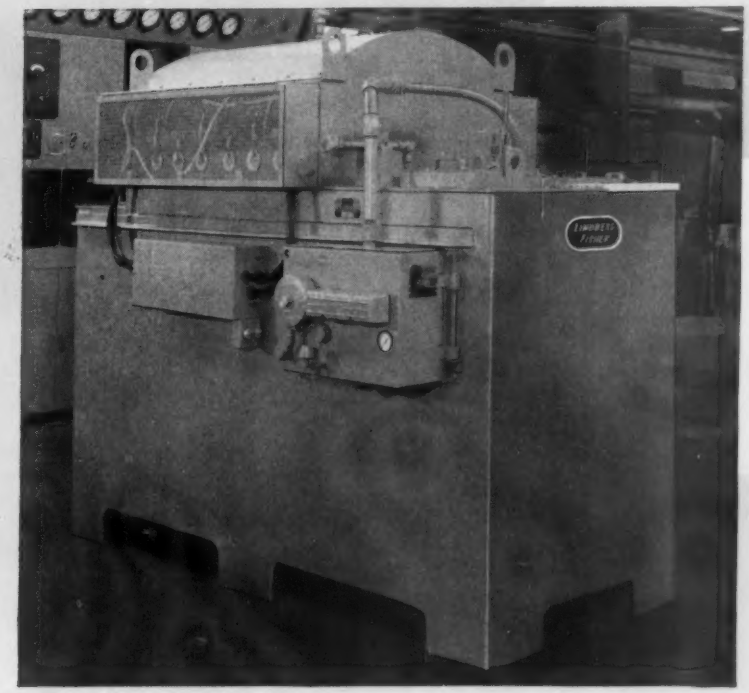
There's a Lindberg Aluminum Holding Furnace Just Right for Your Specific Job



This is Little Joe, the Lindberg Autoladle, the first practical automatic aluminum ladling unit yet devised. An exclusive feature of Lindberg electric resistance holding furnaces, "Little Joe" makes automatic casting of aluminum fast, dependable and economical.

Electric resistance holding furnaces for aluminum have been a specialty of Lindberg engineers for years. These furnaces have proved themselves in superior operation in varied industries, the world over. Now Lindberg offers a complete line, newly-designed, available in capacities of 1,000, 1,500, 2,000, and 3,500 lbs. If your production processes require proper holding of aluminum you can depend on Lindberg to provide just the right equipment for the most efficient and practical answer to your problems.

Lindberg makes a wide variety of melting and holding furnaces for aluminum, brass, bronze, tin, zinc, lead and other non-ferrous metals. These include aluminum induction, nose-pouring crucibles, electric resistance holding furnaces and big reverbs. For foundry, permanent mold or die-casting plant, independent or captive, there are Lindberg melting and holding furnaces to fit every need.

If your problem in this field needs a special solution Lindberg's design staff can find it. Just get in touch with the Lindberg plant or the Lindberg Field Representative in your locality, or write Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.

LINDBERG heat for industry

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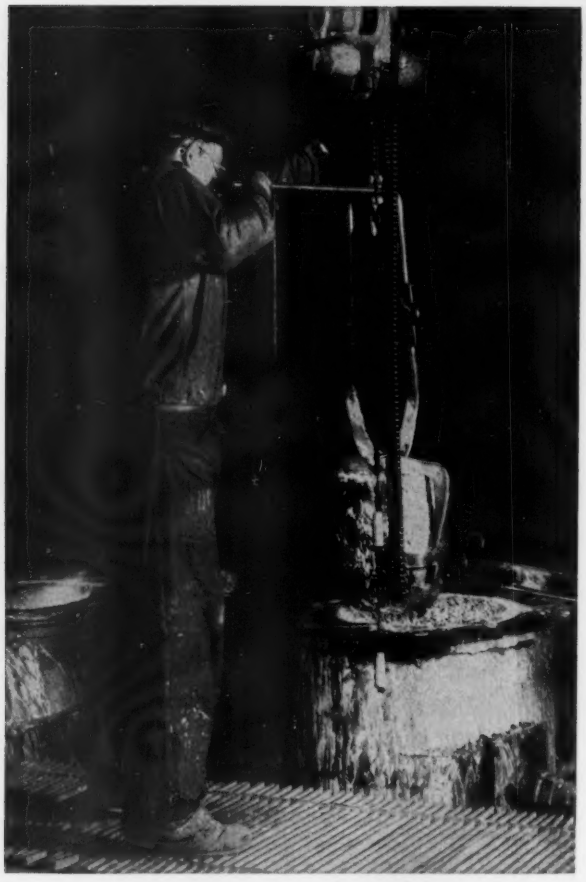
NEW . . .

BRASS and BRONZE FOUNDRY PRACTICE



By HARRY M. ST. JOHN

THIS VOLUME brings together in one place the facts and theories of brass and bronze foundry practice. Much material has been published on these subjects, but for the most part it is scattered through a variety of publications. Now brass founders have available a comprehensive, modern treatment of all aspects of brass foundry theory and practice in one source.

The 250 pages of *Brass and Bronze Foundry Practice* cover the entire range of brass foundry operations. Its 23 chapters discuss alloys, technical and operating procedures, quality control, testing, brass foundry economics, cost control, casting design, patternmaking, foundry layout, and salvage of waste material. The text is supplemented by 85 illustrations which clarify and enlarge on the subject matter. A complete index expands the usefulness of the book as a reference work.

Harry M. St. John, author of *Brass and Bronze Foundry Practice,* is exceptionally qualified to make this contribution to the progress of the thousands of foundries producing brass and bronze castings. Most recently, he was associated with Crane Co., where he was superintendent in charge of brass foundry, brass forging, and die casting of aluminum and zinc. He was awarded the William H. McFadden Gold Medal of AFS in 1947, for his many outstanding contributions to the society and to the foundry industry.

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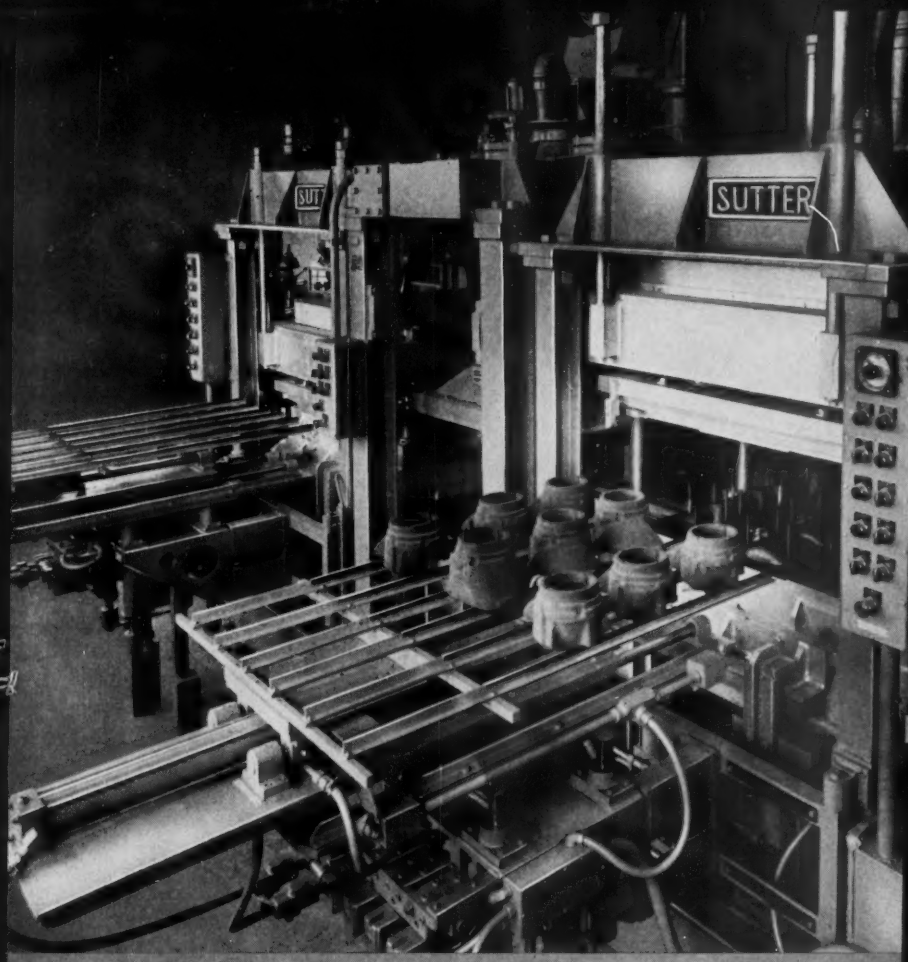
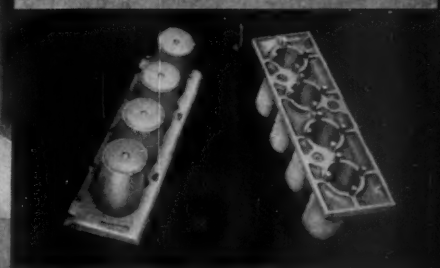


NEW! FULLY AUTOMATIC TWO-STATION

SHELL CORE and MOLD BLOWERS

Now . . . a two-station fully automatic machine that's designed to produce shells or sets of shells at up to 90 cycles per hour! The new Sutter SP-1500 and 1550 machines produce smooth, precision shell cores or molds, fully cured, ready for immediate use at the molding line. These machines save man-hours, fuel, rehandling, breakage, cleaning and overall costs . . . and produce better castings.

Multiple stations allow faster cycling of shell patterns between the blow and the cure and strip stations. Shell take-out and pattern spray equipment are standard on both units. All electrical, gas and pneumatic equipment conforms to both J.I.C. and national safety standards. Maximum pattern sizes: SP-1500: 36″ x 27″ x 10″; SP-1550: 26″ x 20″ x 10″. Write or call now for complete information on this revolutionary step toward new foundry practices.



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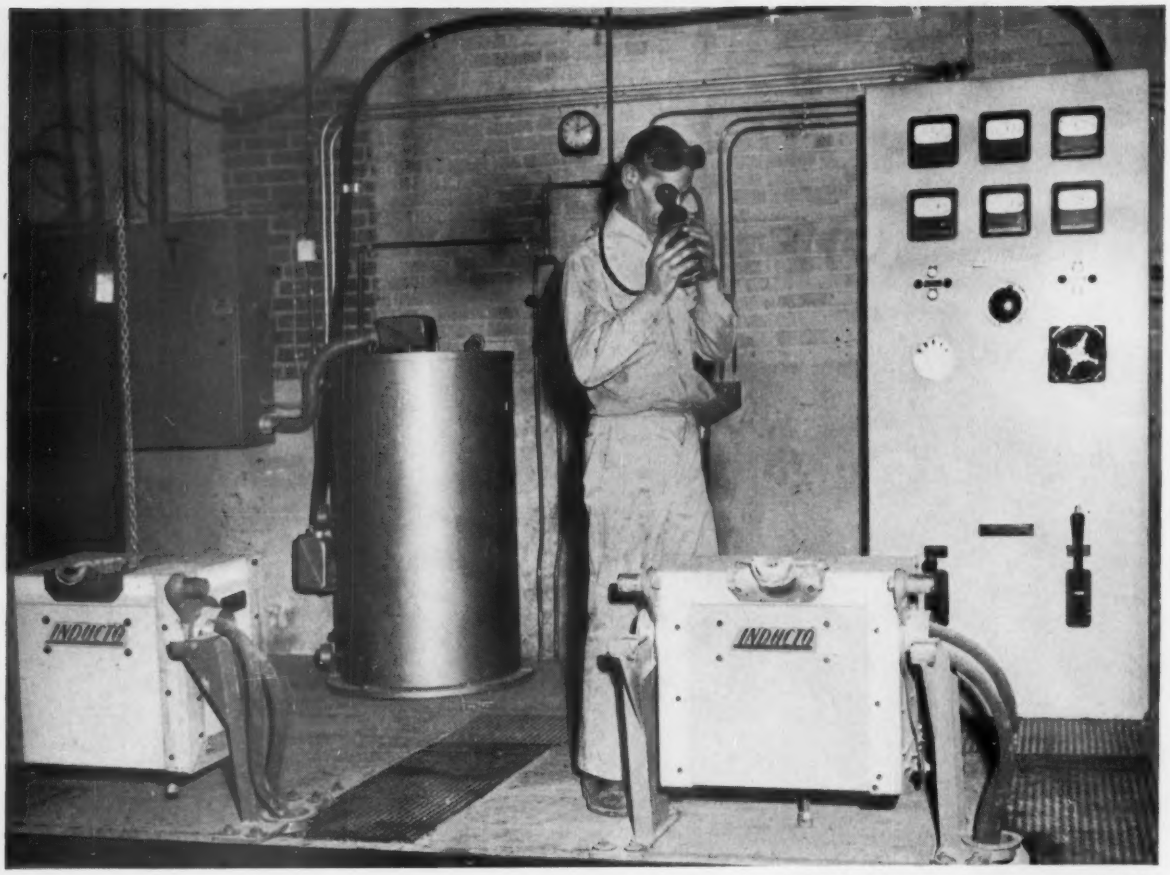
407 HADLEY STREET • HOLLY, MICHIGAN

Designers and manufacturers of foundry machines and equipment.

Circle 592 on Page 51

ANOTHER INDUCTO INSTALLATION...



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Connecticut Investment Casting Gets Accurate Heat Control In Every Melt With INDUCTO Furnaces

When melting steel alloys for precision casting, precise temperature control is an important factor. Of course, controllable analysis of the alloys in heat after heat, homogeniety of each melt and high melting speeds are important, too! That is why Connecticut Investment Casting Corporation selected INDUCTO furnaces for the job.

INDUCTO high-frequency induction furnaces and controls have proven ideal for precision casting methods. For in addition to fast, clean, accurate melting, they are compact, efficient and designed for long, maintenance-free service.

The furnaces have sturdy welded frames which minimize distortion and assure longer lining life. The water-cooled leads enter the furnace through the trunnion thereby reducing the twisting and flexing which shorten lead life.

The control is compact and easy to operate. Furnace selector switches are conveniently mounted on the front of the panel. The control is shipped completely assembled and ready for installation.

For more complete details, write for Bulletin 70. Inductotherm Corporation, 412 Illinois Avenue, Delanco, N. J.

INDUCTOTHERM corporation

Reader Information Service

FOUNDRY

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 169 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

FURTHER INFORMATION on Advertised Products ?

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November 1958

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555	570	585	600	615	630	645	660
556	571	586	601	616	631	646	661
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565	580	595	610	625	640	655	670

671	686	701	716	731	746	761	776
672	687	702	717	732	747	762	777
673	688	703	718	733	748	763	778
674	689	704	719	734	749	764	779
675	690	705	720	735	750	765	780
676	691	706	721	736	751	766	781
677	692	707	722	737	752	767	782
678	693	708	723	738	753	768	783
679	694	709	724	739	754	769	784
680	695	710	725	740	755	770	785
681	696	711	726	741	756	771	786
682	697	712	727	742	757	772	787
683	698	713	728	743	758	773	788
684	699	714	729	744	759	774	789
685	700	715	730	745	760	775	790

791	806	821	836	851	866	881	896
792	807	822	837	852	867	882	897
793	808	823	838	853	868	883	898
794	809	824	839	854	869	884	899
795	810	825	840	855	870	885	900
796	811	826	841	856	871	886	901
797	812	827	842	857	872	887	902
798	813	828	843	858	873	888	903
799	814	829	844	859	874	889	904
800	815	830	845	860	875	890	905
801	816	831	846	861	876	891	906
802	817	832	847	862	877	892	907
803	818	833	848	863	878	893	908
804	819	834	849	864	879	894	909
805	820	835	850	865	880	895	910

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November 1958

551	566	581	596	611	626	641	656
552	567	582	597	612	627	642	657
553	568	583	598	613	628	643	658
554	569	584	599	614	629	644	659
555	570	585	600	615	630	645	660
556	571	586	601	616	631	646	661
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559	574	589	604	619	634	649	664
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565	580	595	610	625	640	655	670

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799	814	829	844	859	874	889	904
800	815	830	845	860	875	890	905
801	816	831	846	861	876	891	906
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FOUNDRY

Reader Information Service

Use these cards for more information on anything advertised in this issue, or for extra copies of editorial articles. Don't overlook additional cards on page 169 for more information on items described in the Foundry Equipment and Supplies Digest section in this issue.

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Permit No. 36
CLEVELAND, OHIO

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

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Penton Building
Cleveland 13, Ohio

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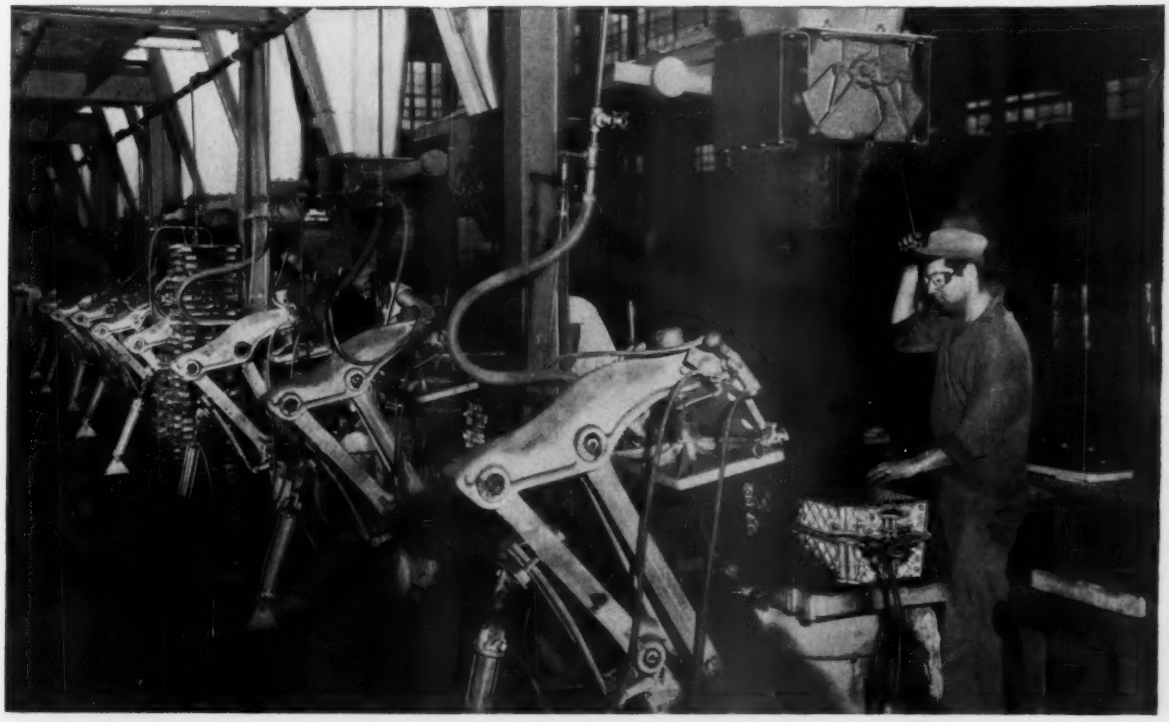
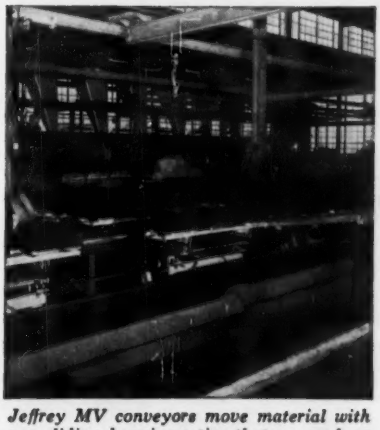
JEFFREY helps modernize A. C. Williams Co. foundry at Ravenna, Ohio



Jeffrey hoppers supply sand directly to molders' stations; save considerable time, effort and floor space.



Jeffrey MV conveyors move material with non-sliding, hopping action that assures long deck life; abrasive wear is negligible.

Jeffrey equipment played a major part in improving plant efficiency when A. C. Williams Co. modernized its foundry. Jeffrey overhead sand distributing systems, MV conveyors, aerators and apron conveyors are being used.

You can call on Jeffrey for equipment or for complete system engineering to improve efficiency and to boost profit. Jeffrey engineers are thoroughly familiar with all phases of foundry operations. Jeffrey-built equipment is expressly designed for the high-speed, low-maintenance operation modern foundries require.

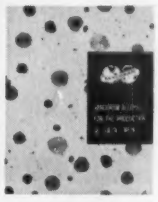
Complete information on Jeffrey foundry equipment and service is described in Catalog 911. Write for your copy. The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT . . . TRANSMISSION MACHINERY . . . CONTRACT MANUFACTURING

Circle 594 on Page 51

TWO-WAY SOLUTION FOR IMPROVED DUCTILE IRONS! Vancoram Noduloy® and Inoculoy® Alloys are the keys to better nodular irons. Noduloy provides maximum nodularizing effect . . . and Inoculoy is a powerful graphitizer. What's more, there are six types of Noduloy and two of Inoculoy to satisfy *all* requirements. Find out about the added savings and efficiency realized when you put these two products to work in your foundry!



A new brochure describing these alloys and listing recommended uses is now available. Call your nearest VCA Office or Vancoram Distributor. Or, if you prefer, write for your free copy.

Vancoram Products for the Iron Foundry are also distributed by:

Pacific Metals Co., Ltd. • Steel Sales Corporation
J. M. Tull Metal & Supply Co., Inc.
Whitehead Metal Products Company, Inc.
Williams & Company, Inc.

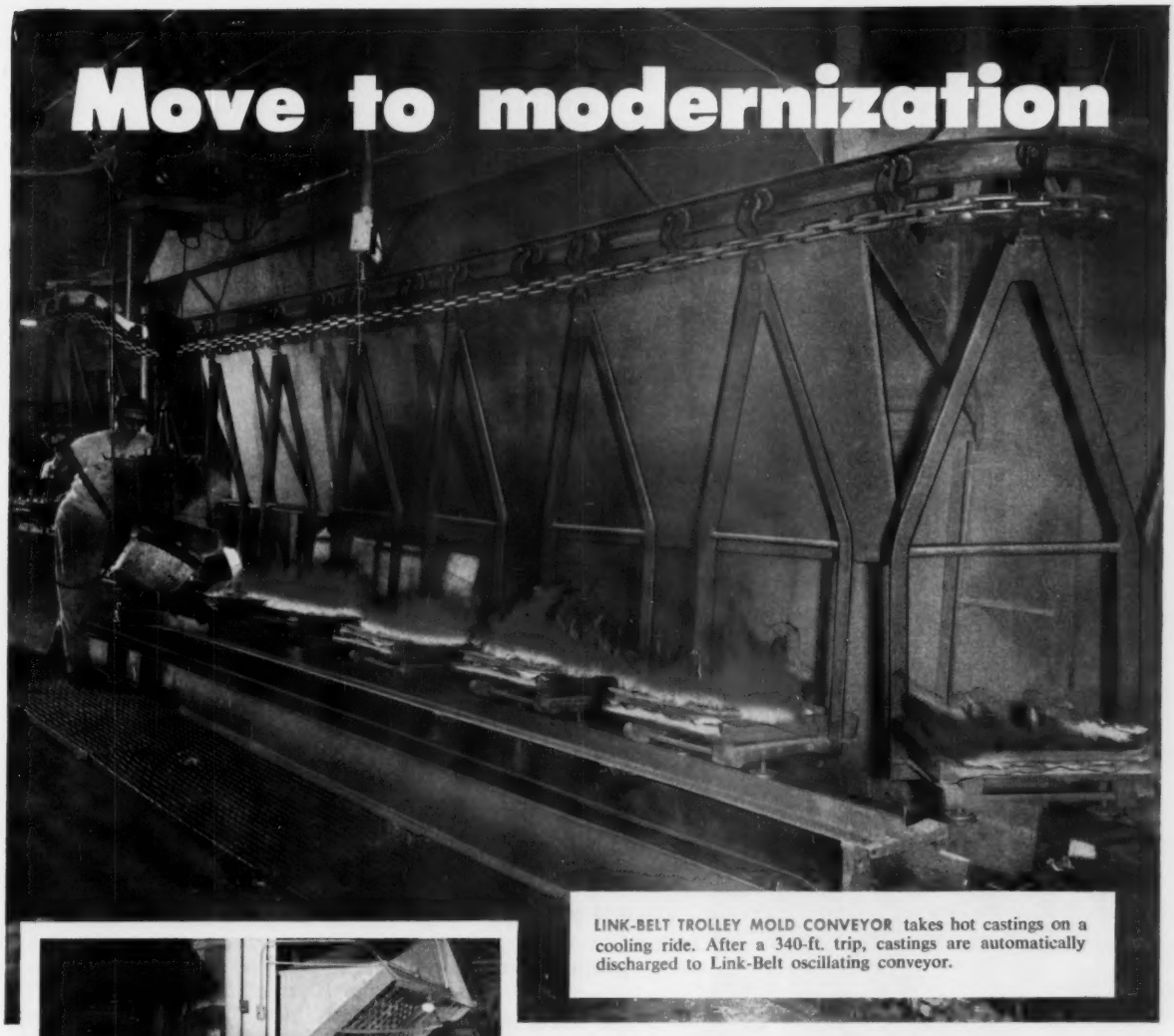
VANCORAM

VANADIUM CORPORATION OF AMERICA

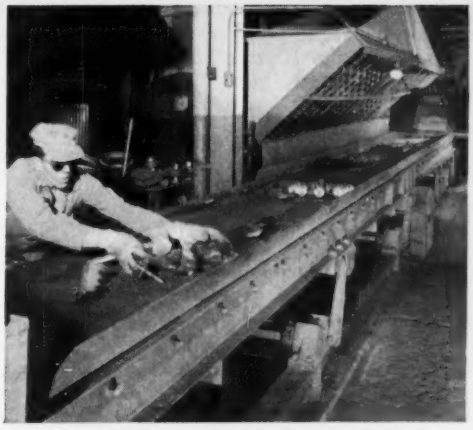
Producers of alloys, metals and chemicals

420 Lexington Ave., New York 17, N.Y. • Chicago • Cleveland • Detroit • Pittsburgh

Move to modernization



LINK-BELT TROLLEY MOLD CONVEYOR takes hot castings on a cooling ride. After a 340-ft. trip, castings are automatically discharged to Link-Belt oscillating conveyor.



LINK-BELT TORQMOUNT OSCILLATING CONVEYOR has perforated plate at receiving end for separating sand and castings. Castings then cool along 36-ft. route and are sprued and sorted near discharge end.

LINK-BELT trolley and oscillating conveyor work together to give Brillion Iron Works a cleaner, cooler, more productive foundry

Here's a Link-Belt conveyor combination that has worked wonders at this midwest gray iron foundry.

A Link-Belt trolley mold conveyor was easily installed around existing equipment, releasing floor space for storage and ventilating equipment . . . an addition that has eliminated much of the smoke and gas that existed in the pouring area. And with heavy lifting and carrying eliminated, working conditions are safer and easier . . . pouring and cooling are accomplished more efficiently.

From shakeout to sorting, hot castings move smoothly on a Link-Belt Torqmount oscillating conveyor. Its full-time positive action refuses to dampen under heavy surge loading conditions . . . castings are conveyed uniformly. Power requirements and maintenance are minimized with unique torsion-spring action.

Link-Belt offers unmatched experience plus a broad line of sand handling and preparation machinery to modernize any phase of your operation—or to equip a complete, new foundry. For further facts, contact your nearest Link-Belt office. Or write for Book 2423. 14.957

LINK-BELT

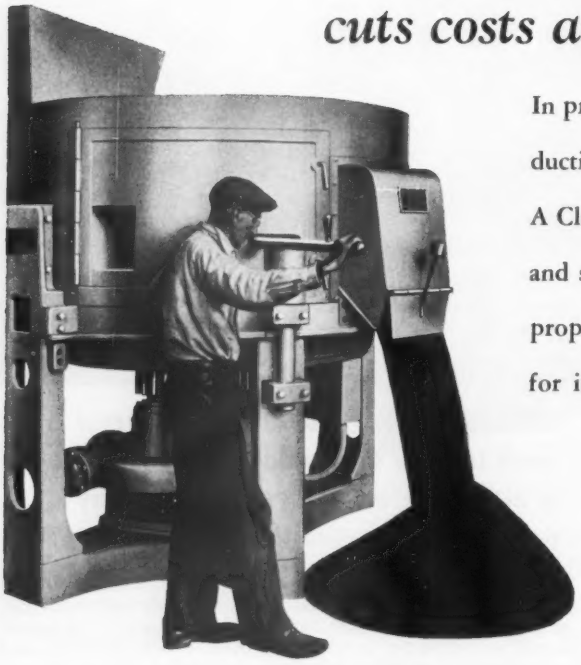
CONVEYORS AND PREPARATION EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

the *Clearfield* mixer

cuts costs and speeds production



In preparing foundry sand, if you can speed production and maintain high quality *you cut costs.* A Clearfield Mixer, with its speed, dependability and special mixing features, prepares your sand properly and exactly as you want it, thus paying for itself many times over.

Write today for Catalog No. 83. Clearfield Mixers are available in many sizes to meet every need.

CLEARFIELD
MIXER

fast,
thorough
sand preparation

CLEARFIELD
MACHINE COMPANY
CLEARFIELD
PENNSYLVANIA, U. S. A.

Circle 597 on Page 51

valuable asset: RESEARCH

One of Semet-Solvay's most valuable assets is its recently expanded research facilities at Ashland, Ky. The uniformity and high quality of our Foundry Coke is directly attributable to the constant research vigilance exercised in every phase of production from mine to finished product. Here at Ashland, in a coke test oven the measurable qualities of our coking coals are quickly ascertained and mixes adjusted to insure a uniform high quality.

No pygmy this pilot plant test oven, but a large capacity unit taking a 700-pound charge. The large size makes certain there will be no loss of accuracy in the interpretation of results because of too much scaling down. Thus the coal charge and the setting of standards for full-scale operation, as determined by testing, are thoroughly reliable.

Plans for the future call for a program of continued use of the pilot plant so that the cokes continually improve in uniformity.

In addition to the high quality of the product, which stems from continuous research, the purchase of your Foundry Coke from Semet-Solvay has many other advantages: Semet-Solvay plants and coal mines are strategically located to serve you. Availability is constant, thanks to Semet-Solvay's extensive productive facilities. Five coke sizes are available to meet the requirements of all sized cupolas and melting practices. And last but not least, we offer advice—a free metallurgical service department staffed by specialized technicians. Their advice is yours for the asking.

NEW ASHLAND TEST OVEN

Call your Semet-Solvay office today or write us directly for the *complete* story on Semet-Solvay Foundry Coke. You'll find it both interesting and profitable.

Allied Chemical

For Better Melting . . .

SEMET-SOLVAY DIVISION

DEPT. 521-BH, 40 RECTOR STREET, NEW YORK 6, N.Y.

Buffalo • Cincinnati • Cleveland • Detroit

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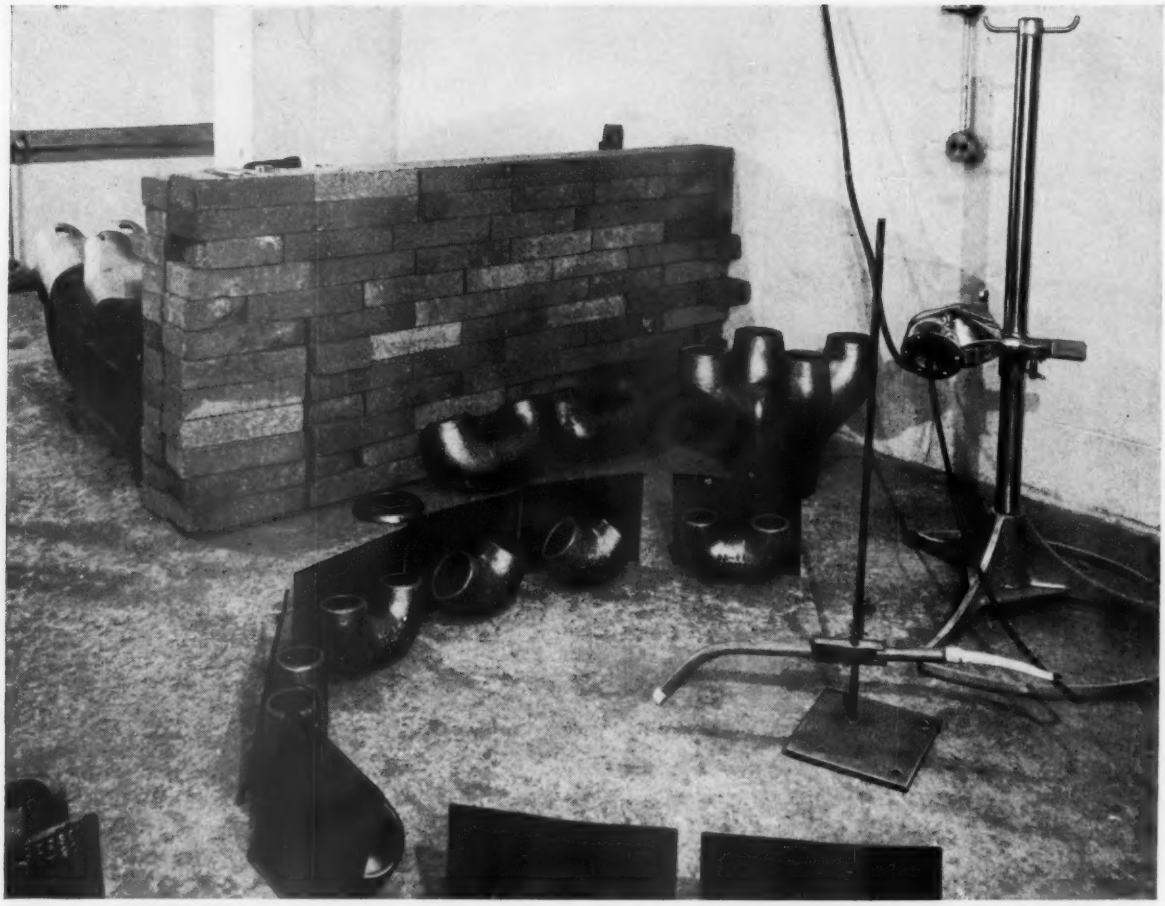
Western Distributor: WILSON & GEO. MEYER & CO., San Francisco • Los Angeles

Circle 598 on Page 51



OHIO STEEL FOUNDRY CUTS COSTS MORE THAN 50% WITH NUCLEAR SYSTEMS' RADIOGRAPHY MACHINES

Art Gross, chief metallurgist of Ohio Steel Foundry Co., Springfield, Ohio, states that by using two radiography machines designed and manufactured by Nuclear Systems, a division of The Budd Company, approximately 3000 "shots" a month are made in testing castings of various sizes and shapes.

"By exposing a number of castings at one time," said Mr. Gross, "Ohio Steel has cut operating costs to less than half of what we'd spend if we used X-ray equipment. Also, if we used X-ray, we'd require 50% more people on the job to maintain safety from exposure.

"Using Nuclear Systems' models 10 (shown above) and 50, we keep the machines in use 24 hours a day checking production fittings such as valves, elbows and tees. To control quality we radiograph about 10% of this type equipment."

Nuclear Systems manufactures a complete line of gamma radiography machines for all industrial requirements. Offices in Philadelphia, Chicago, San Francisco and Los Angeles. Sales representatives in principal cities. Catalog on request.

NUCLEAR SYSTEMS

A DIVISION OF THE BUDD COMPANY, Philadelphia 32, Pa.

IN CANADA—TATNALL MEASURING AND NUCLEAR SYSTEMS, LTD.
46 HOLLINGER RD. • TORONTO 16, ONT

Budd

2 GROUPS WHO LOVE *Famous* CORNELL CUPOLA FLUX

often imitated
but never equalled!

MELTERS know how easy Famous Cornell Cupola Flux is to use. One scored brick with each ton charge of iron—just that simple. The result: cleaner metal.

CUSTOMERS appreciate foundries who use Famous Cornell Cupola Flux because cleaner metal makes for better castings, easier to machine. Ask to have a Cornell Flux sales engineer call on you. Write for Bulletin 46-B.

Try Famous CORNELL Aluminum and Brass Flux • Send for Bulletin 46-A.

The CLEVELAND FLUX Company
1026-40 MAIN AVENUE, N. W. • CLEVELAND 13, OHIO
Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes—Since 1918

FAMOUS CORNELL FLUXES
Trade Mark Registered

Circle 600 on Page 51

NO CURL...

The Biggest News in

Safety Leggings and Spats

...thanks to American Optical Engineering!

ADVANTAGES

1. **Positive Protection against Molten Metal Splash**
2. **Snug Conformity of the Flare with the Shoe**
3. **Longer Life — Up to 400% Approximately**

You're looking at a revolutionary development in Protective Leggings and Spats — American Optical's new "no-curl" flare. It's made of a specially developed compound which always "behaves" — *lies flat on the shoe.* We've tested it against all molten metals from lead to steel. One steel mill, for example, reported no curling — *no sign of curling* in eight to ten weeks of constant use!

Yes, leggings and spats made with this flare will give you and your men up to 400% more active use than leggings and spats made with conventional flares.

So, once again American Optical comes up with a quality "first" that gives you more for your money — proving it *pays* to insist on Ⓐ trademarked safety products. Your nearest American Optical Safety Products Representative can supply you.

S-1512CL SPRING TYPE LEGGING

Flare is 5½" down crown. Chrome tanned cowhide uppers riveted to spring steel frame. No adjustment necessary. Easily put on and removed. Fits securely at ankle and below knee. Protects lower leg, ankle, instep.

S-1481A Same as S-1512 but with uppers of asbestos.

Both S-1512CL and S-1481A have spring clip on instep which holds flare in position.

S-7X 211 SPAT

Flare is 7½" long down the crown — long enough to be trimmed to the smaller foot. 2 leather bag straps on leg have slide fasteners for quick adjustment. Snap fasteners for quick release. Chrome tanned cowhide uppers with wide elastic webbing also equipped with 2 snap fasteners for speedy release. Understrap is same type of material as flare and is replaceable.

Always insist on the Ⓐ Trademark on Lenses and Frames

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

"It's the lowest cost alloy for ductile iron"

Foundries find that ELECTROMET's magnesium-ferrosilicon is an economical, convenient source of magnesium for ductile iron. When added to a suitable composition, the alloy gives maximum ductility by promoting a matrix of soft ferrite. By adjusting the analysis, it can easily be used in high-strength irons having somewhat lower ductility.

Magnesium-ferrosilicon is available in grades with or without cerium. Cerium (0.5 or 2%) helps control unwanted residual elements which hinder the formation of spheroidal graphite. For further information and technical assistance, contact your ELECTROMET representative.

ELECTRO METALLURGICAL COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

Write for the folder, "Magnesium-Ferrosilicon for Ductile Iron."

Electromet

FERRO-ALLOYS AND METALS

UNION CARBIDE

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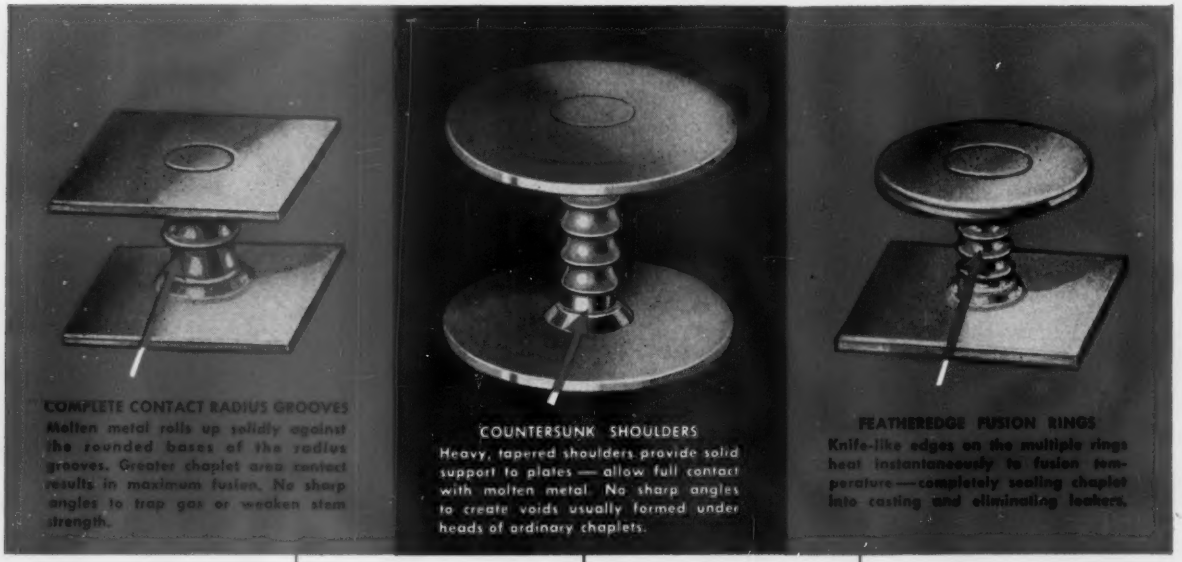
Circle 602 on Page 51

better production... less waste...

fine FANNER

DOUBLE HEAD GROOVESTEM CHAPLETS

provide maximum fusion and solid core support



COMPLETE CONTACT RADIUS GROOVES
Molten metal rolls up solidly against the rounded bases of the radius grooves. Greater chaplet area contact results in maximum fusion. No sharp angles to trap gas or weaken stem strength.

COUNTERSUNK SHOULDERS
Heavy, tapered shoulders provide solid support to plates — allow full contact with molten metal. No sharp angles to create voids usually formed under heads of ordinary chaplets.

FEATHEREDGE FUSION RINGS
Knife-like edges on the multiple rings heat instantaneously to fusion temperature — completely sealing chaplet into casting and eliminating leakers.

FULL STRENGTH
Reinforced construction at all required points provides maximum support without use of extra heavy metal.

TIN OR COPPER COATING
The surest protection against rust, as well as aid to fusion. Readily alloys with iron and steel, lowering melting point and improving fusion. Also available in pure copper.

PRECISION TOLERANCES
Held to ± .002 on most sizes. Fanner reputation for accuracy is unequalled.

WIDE RANGE OF SIZES
Fanner Groovestem Doublehead Chaplets are made in a variety of styles, in stem sizes from 3/16" to 1¼".

Fine Fanner Double Head Groovestem Chaplets are designed to take advantage of the characteristics of molten metal. Their exclusive design and superior construction assure the production of higher quality castings through solid core support . . . complete fusion . . . freedom from leakers and accurate wall thicknesses. Foundries doing critical casting work standardize on Fanner Groovestem Chaplets to secure maximum casting efficiency on every job. Find out how they can help you get better production, reduce waste and save money. Write for samples and prices now!

THE FANNER MANUFACTURING CO.

BROOKSIDE PARK CLEVELAND 9, OHIO

Designers and Manufacturers of Fine Fanner Chaplets and Chills

Castings that need less finishing are poured in Durez-bonded shell molds at Albion Malleable Iron Co.

Foundry keeps customers sold with shell-molded castings

More than 200 times every hour, another shell mold moves into the pouring line at Albion Malleable Iron Co., Albion, Mich. Metal pours into the still-hot shell—and another casting goes on its way to a satisfied customer.

Satisfied—because these shell-molded castings need less finishing than sand castings. Their dimensions are more uniform. Surfaces are smoother; details are sharper.

These advantages add up to good business for Albion. They'll add up to good business for *your* foundry, too.

Shell molding with Durez foundry resins is the way to get them. Like many other progressive foundries, Albion uses Durez resins 100%!

Your Durez technical man can help you plan and carry out a conversion to shell. He's foundry-trained; backed by 37 years of resin experience and research. Call him in soon.

For up-to-the-minute facts on shell molding for your foundry, send for the new 32-page "Durez Guide to Shell Molding." It's revised, fully illustrated; covers patterns, materials, mixing, temperatures, lubricants, molds, cores. Write for it today.

DUREZ® HOOKER CHEMICALS PLASTICS

PLASTICS DIVISION
HOOKER CHEMICAL CORPORATION
1011 Walck Road, North Tonawanda, N. Y.

Circle 604 on Page 51

Give your foundry

"THAT AIR OF DEPENDABILITY"

with

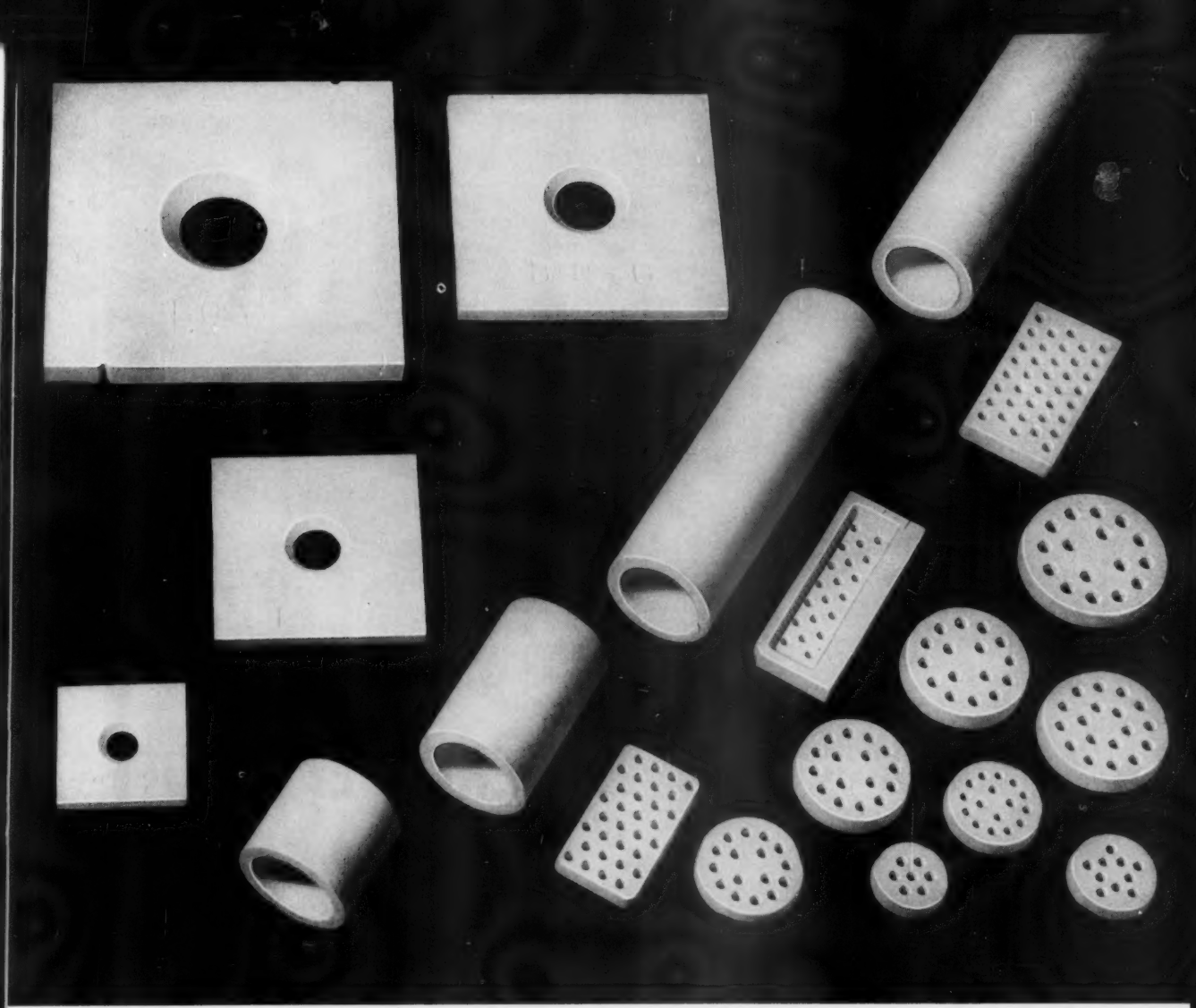
type Y

COMPRESSORS

• 75 to 250 Horsepower • Built-in motor, coupled, and belt drive • Simple, compact, widely adaptable, heavy-duty • Built for "round-the-clock service" with minimum of attention • Other types of compressors available in sizes to 5000 hp and pressures to 15,000 psig.

Chicago Pneumatic *8 East 44th Street, New York 17, N. Y.*

AIR AND GAS COMPRESSORS • VACUUM PUMPS • PNEUMATIC TOOLS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS



what users like best about

Louthan gating and risering refractories . . .

There's a good reason why Louthan is making more and more refractories for the foundry field. *Users like them,* like the way they perform on the job, like the cost reductions they make possible.

Louthan Strainer Cores are now available in more sizes and shapes—and for *steel, iron, brass* and *bronze* castings. All provide an accurate choke for positive control of metal flow, eliminate slag and oxide inclusions.

Louthan Breaker Cores facilitate rapid removal of the riser with subsequent labor savings. There is no core gas. You get cleaner castings. Available for all riser diameters from 2″ to 12″, and for use with *any metal casting* risering from a flat surface.

Louthan Gate Tiles prevent erosion of the gates in steel castings. They safely withstand high temperatures, will not react with the molten metal. All popular diameters and lengths can be furnished, also elbows and tees to match.

FREE: Write for this new Louthan product booklet. You'll find that our products match your needs and perform the way you like them to.

THE Louthan MANUFACTURING COMPANY

(A SUBSIDIARY OF FERRO CORPORATION) EAST LIVERPOOL, OHIO

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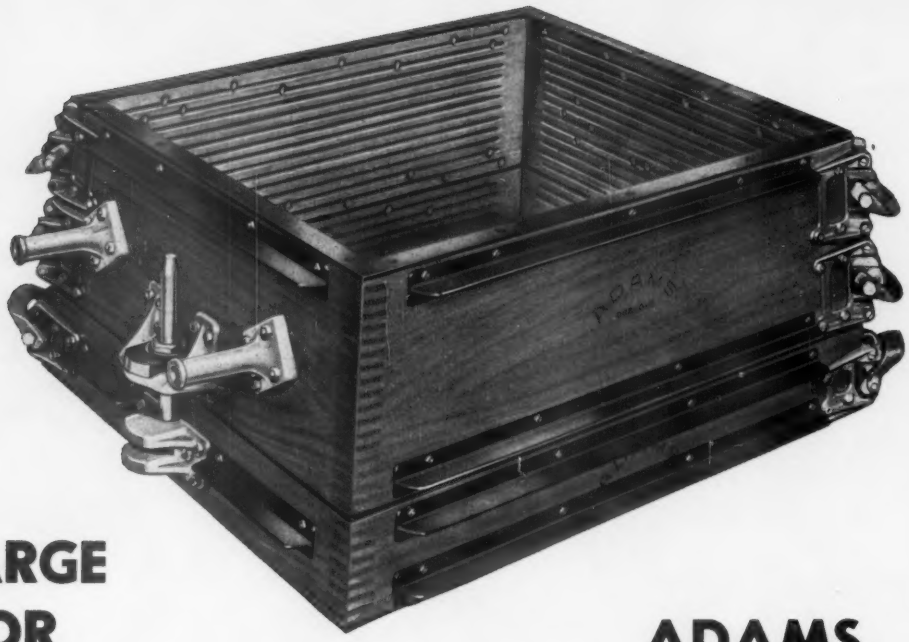
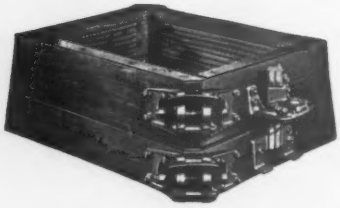
Circle 606 on Page 51



LARGE OR SMALL



Patent No. 2393200
Other Patents Pending

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EASY-OFF FLASK

PIN AND EAR ARRANGEMENT SUPPLIED TO SUIT YOUR PRESENT PATTERN PLATE GUIDES

Write us today for our circulars on Cherry Easy-Off Flasks and Cast Iron or Aluminum Jackets.

ADAMS CHERRY EASY-OFF FLASKS

with ADAMS JACKETS

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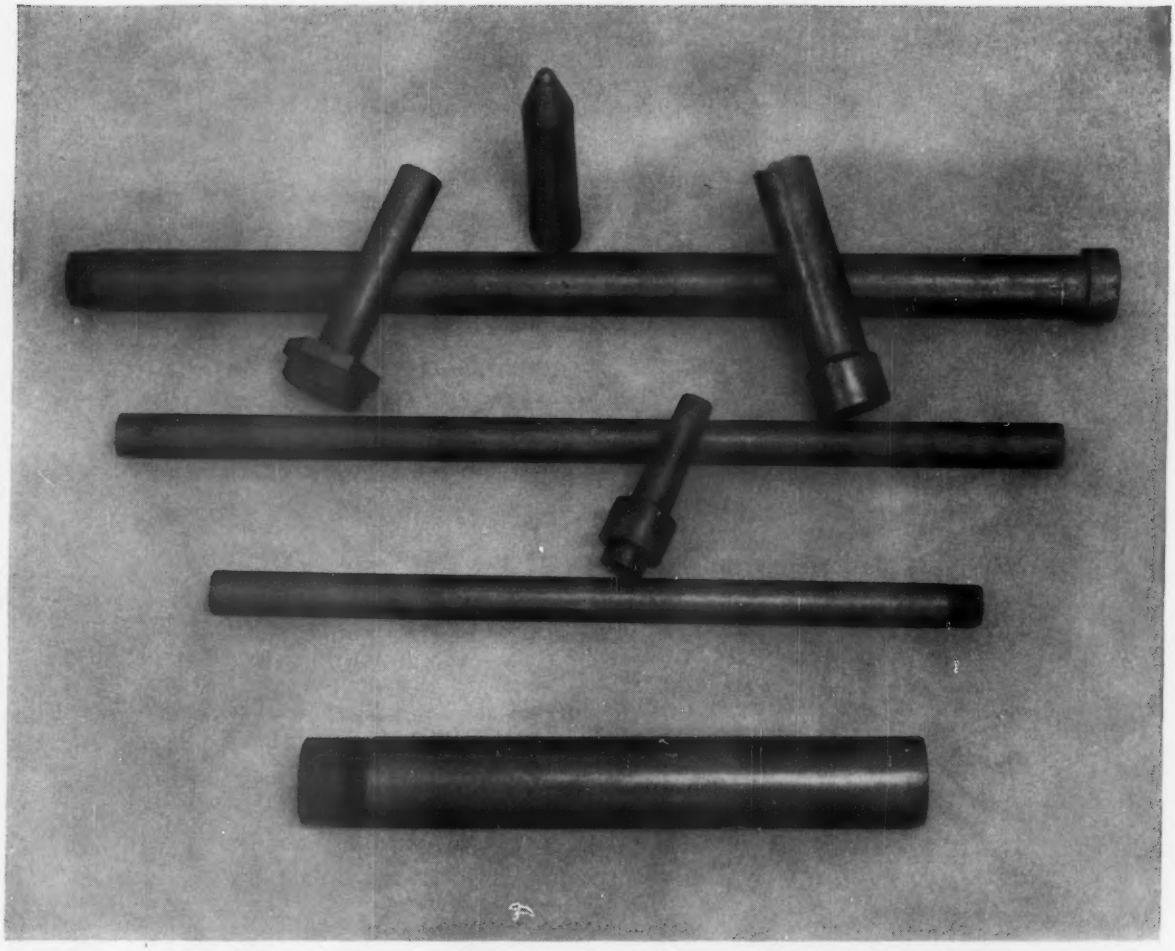

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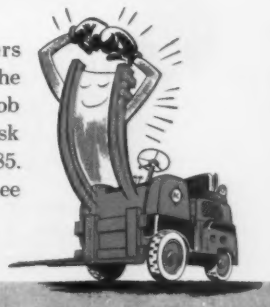

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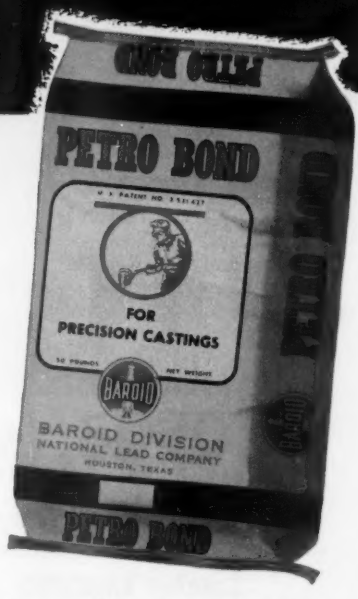

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Circle 611 on Page 51

Readers' Comment

It's Not Always Simple

To The Editors:

I appreciate the comments of Ralph Lee in the August issue of Foundry concerning our handbook. I rather doubt that the reading was as difficult as was intimated. But he is certainly correct in criticizing the way many technical articles are written.

I believe, however, there is much to be said on the other side. Too many people in our industry refuse to use what is keeping their ears apart and excuse their laxity by claiming to be waiting until "somebody simplifies the subject so that I can understand it."

The current issue of our *Gray Iron News* is enclosed, and I believe you will admit that the article on "Mold Pressure" is written about as simply as is possible and yet is accurate.

The casting of metal is not a simple science and it cannot be entirely explained in words limited to a third-grade vocabulary. If our industry is to progress there must be some effort on the part of management to develop a broader engineering acumen.

Charles F. Walton
Technical Director

Gray Iron Founders' Society
Cleveland 14, *Ohio*

Backbone Needed

To The Editors:

I am sure that a lot of high-principled foundrymen have been looking for an expression to describe some of their fellow competitors, but your "Backbone Needed" editorial in a recent issue should satisfy that desire for finding the proper expression. I think that our experience is that there is not *more* backbone needed, but backbone itself, in order to curtail or stop what you have termed "unrealistic price cutting."

Up until a year or so ago, I was making regular door-to-door sales calls and contacts to our customers and prospects. It was my firm belief at that time that purchasing people were doing much, whether intentionally or unintentionally, to drive foundries into the corner and subsequent red ink by the typical pressures they exerted. True, they have been guilty of this and more so in depressed times.

In my opinion, many of today's foundrymen must have awful guilty souls resulting from some of the fantastic and ridiculous prices we run across so often in competition. This type of operation by those foundries who are unjustifiably cutting prices without any equivalent true cost reductions does nothing more than pull the foundry industry down from the level which it has taken longer than most industries to attain.

Your editorial has prompted a lot of comment by this infant in the foundry business, but an individual can become mighty disturbed, knowing that part of the reason for operating only three or four days a week is due not only to the general business decline, but due to your fellow-competitor who has under-cut you with *unjustified* prices.

Peter Robert Rentschler
Vice President

Hamilton Foundry & Machine Co.
Hamilton, Ohio.

The Tension Test

To The Editors:

I have noted the second excellent article by J. B. Caine on "The Case Against the Tension Test" in the September issue.

Mr. Caine's material gets better with each article. I certainly hope you will continue to point out the fallacies in test bar physical strength ratings since this will ultimately open the door to a wider usage of castings based on their known performance value rather than erroneous "book values."

R. A. Lawson
Vice President, Marketing

Monarch Aluminum Mfg. Co.
Cleveland 2

Mixup Down Under

To The Editors:

Would you please send another copy of the February issue of Foundry? There was evidently a mix-up in the post and the envelope arrived around a copy of *The Saturday Evening Post.* We made inquiries at the post office but no trace could be found of the issue of Foundry.

R. A. Cheers
Manager

A. C. Cheers
Melbourne, Australia

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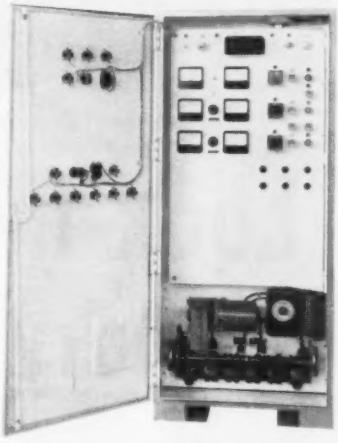

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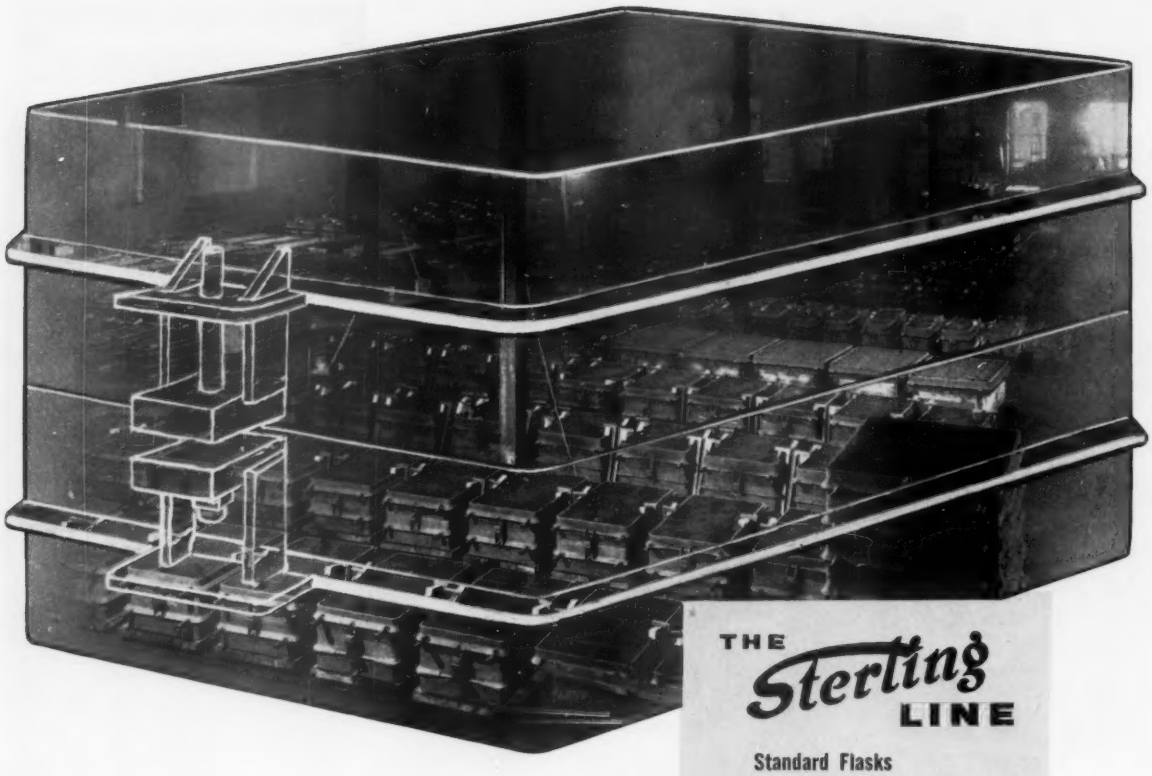

Look into your foundry needs!

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November 1958

We Need Managers

A foundryman familiar with industry conditions in numerous sections of the country recently commented that "poor business ability, not lack of foundry know-how, is the cause of a high percentage of the failures which occur in the foundry industry."

His point is well taken. It appears to be especially true among the small and medium shops. There top management frequently comes up through the operating end of the company. In that phase of the business, men must spend tremendous amounts of time and effort to master the many problems connected with castings production and to keep abreast with developments. Most have learned to make good castings which meet the requirements of customers.

Frequently, however, there has not been sufficient time or a proper incentive on the part of those managing the business to encourage development of similar proficiencies in the fundamentals of good industrial management.

As a result, a foundryman frequently is forced to play by ear when circumstances suddenly place him in a top management position. Some men have that native ability which permits them to bring success and profit to the organization. Others may be forced out of the job, or their inability to manage may cause the company to drift into a precarious position.

But the situation in the foundry industry does have a brighter side. Some companies—and the number is growing—realize that training for management is as important as training for production. College graduates are brought into the organization and given a well rounded training program which includes grounding in all phases of the business. Frequently these young people are sent, at company expense, to special management courses which may be available locally, at educational centers, or through the associations serving the field. Foundries maintaining such training programs are never at a loss to find the proper man for the position which an emergency or company growth has created. The need for "stealing" management manpower from more progressive companies does not exist.

Let's have more attention to management training in the foundry industry.

Frank G. Steinebach

Editor

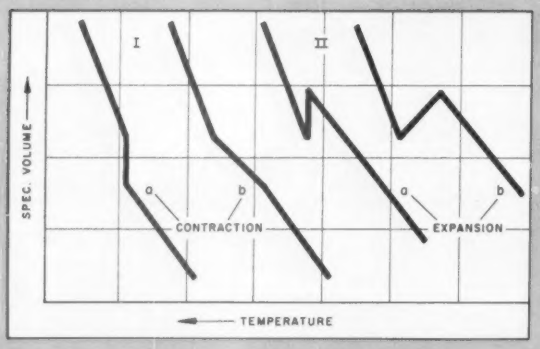

Fig. 1—Schematic temperature-volume curves for alloys without (a) and with (b) solidification range

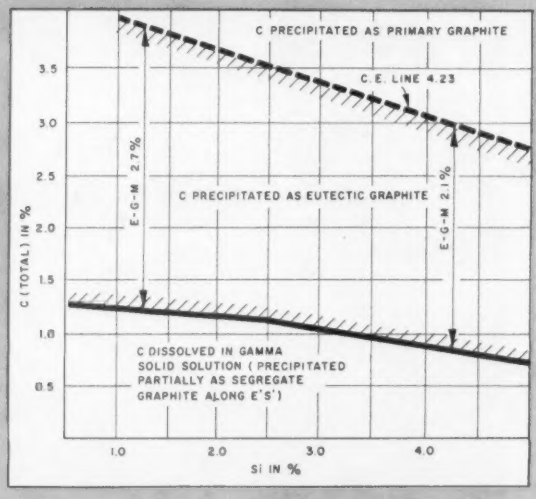

Fig. 2—Change in eutectic-graphite-maximum is shown in relation to the silicon content

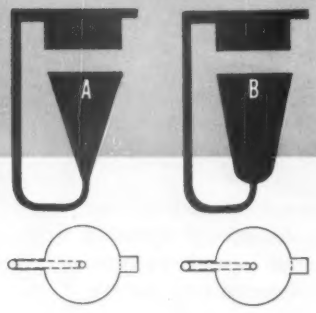

Fig. 3—Experimental shapes for a shrinkage test. Shape B came nearest to meeting the test demands

A Shrinkage

A suitable test specimen, permitting foundries of various countries to compare data on shrinkage of cast iron and other alloys, is described and results of experiments with the specimen reported

IN AN earlier report, A. Wittmoser and W. Seeliger[1] presented a survey of the customary methods for testing cast iron. Additionally, this report included methods of determining the foundry technical properties of molten iron. Under "metallurgical test methods," the designated procedures as well as existing proposals for determining the shrinkage tendency of cast iron were discussed. Although there are numerous proposed methods in the literature, the variety of specimens made comparison of results obtained impossible.

Therefore, in considering the customary theoretical and practical knowledge, the authors endeavored to develop[2] a shrinkage test specimen which would permit a comparison of results of foundries of different countries with good reproducibility.

Principles of Shrinkage—When molten metal is poured into any mold, numerous volume changes occur which may be condensed simply into three groups:

1. Until beginning of solidification (liquid contraction).

2. During the solidification period (solidification contraction).

3. From end of solidification to room temperature (solid contraction).

Contraction in the fluid state cannot function as shrinkage under normal conditions. Contraction in the solid state likewise is without influence on the extent of development of a shrinkage cavity. The volume of the characteristic solidification cavity as shrinkage depends essentially on the difference of specific volume of the metal between beginning and end of the solidification range.

Basically, Fig. 1 represents four types of volume-temperature curves. The volume shows for nearly all metals a steep decrease in solidification range with decreasing temperature (curves Ia and Ib). Some few metals (bismuth and antimony) and alloys (aluminum-antimony and magnesium-tin alloy) are characterized by a marked expansion during solidification (curves IIa and IIb).

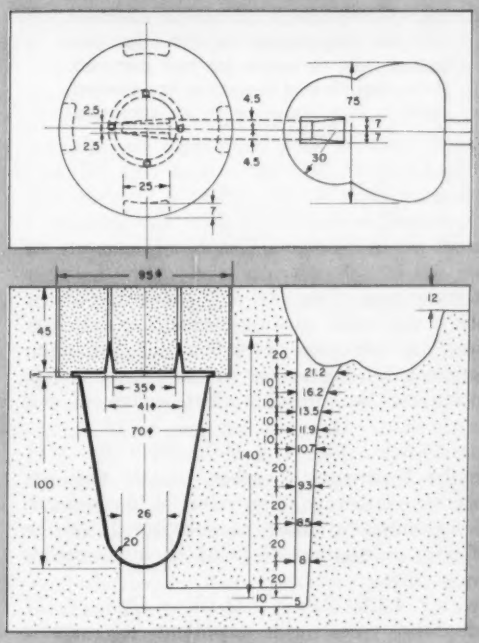

Fig. 4—Adding a thin edge rib at the upper rim of the test piece and a ring-shaped rib on the upper surface to shape B in Fig. 3 fixed the shrink inside the ringed-in area on top of the specimen

Test for Cast Iron

By DR. A. WITTMOSER, Director and H. A. KRALL, Former Member and L. HUETTER, Former Member
Research and Experimental Laboratory
Eisenwerke Gelsenkirchen AG., Gelsenkirchen, Germany

Also, solidifying cast iron alloys during precipitation of free graphite show a volume increase in the solidification range. This phenomenon, however, should not be mistaken for the mentioned anomaly of some alloys. As with graphite-free white iron as well as gray cast iron, the formation of the steel-like metallic matrix in the solidification period is accompanied by a contraction. Through the simultaneous separation of carbon in the free form (as graphite), and thereby a combined volume increase, however, the contraction again will be diminished partially.

The precipitated graphite in the eutectic solidification range is of decided significance in the shrinkage behavior of cast iron. The dissolved carbon in gamma solid solution in comparison has no influence on shrinkage. As A. A. Timmins[3] and W. A. Schmidt, E. Sullivan and H. F. Taylor[4] already have emphasized, the same holds true for carbon which precipitates as kish graphite.

These findings, however, make possible exact predictions on the influence of silicon content on shrinkage (Fig. 2). The top limitation of the eutectic precipitation of graphite is established through the the line of the carbon equivalent 4.23. The low limit line for the range of the eutectic graphite is defined through the maximum solubility of carbon in the gamma solid solution. From the distinct slope of both limit lines, it becomes clear that the maximum possible eutectic graphite volume with eutectic composition is decreased with increasing silicon content. Thereby, the variation on the elevation of the shrinkage slope with increasing silicon content of alloys with the same degree of saturation, is explained.

The precipitated graphite volume in the eutectic range is a determination not available through analytical methods, since the analysis simultaneously determines the graphite precipitated as kish as well as segregate. Therefore, only the calculation method remains open. Here the maximum precipitated eutectic graphite will be determined and will be

Fig. 5—The shrink formation obtained with the ring-shaped rib and edge projection, left, is useful for test purposes. If the ring rib and projection are omitted, right, a flat, valueless shrink conformation is obtained

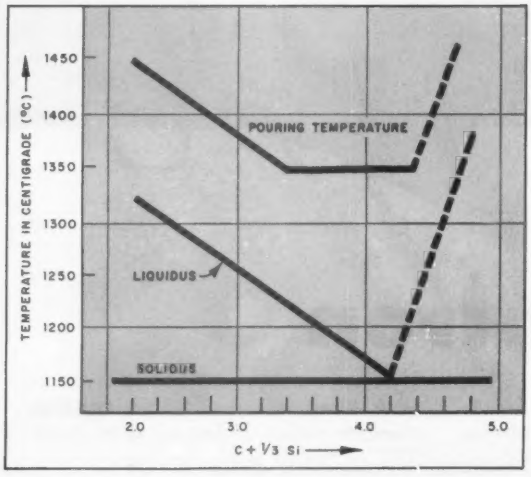

Fig. 6—Pouring temperature must be adapted to the effect of melt composition on the liquidus

designated as the Eutectic-Graphite-Maximum or EGM.

In consideration of present-day knowledge of the influence of the usual alloying elements in cast iron alloys on the solubility of carbon, the maximum possible precipitated graphite in the eutectic range in hypoeutectic to eutectic alloys occurs in the formula:

$$\text{EGM c.e.} \leqq 4.3 = C_t - 1.3 + 0.1\ (Si + P) \quad (1)$$

Since the hypereutectic carbon content does not influence the shrinkage, the value of the eutectic carbon concentration must be substituted for the value C_t for calculation of EGM in hypereutectic cast iron, so that:

$$\text{EGM c.e.} \geqq 4.3 = 2.9 - 0.22\ (Si + P) \quad (2)$$

In doubtful cases it is expedient to examine whether C_t is smaller or larger than C_e, and apply the expression (1) or (2) accordingly.

Developing a Suitable Test Piece—Due to the beginning of crystallization and partly to the very complicated reaction (especially in view of the possibility of solidifying in the metastable system) an especially careful design of the test piece is required. From the preceding statements definite requirements for the most favorable form of a shrinkage test piece are derived:

1. The gate must be selected so that the molten metal flows into the true test body only until the beginning of crystallization. Thereby part of the pure liquid contraction cannot enter in the shrinkage volume.

2. On the other hand, solidification in the test piece must not occur during the pouring process.

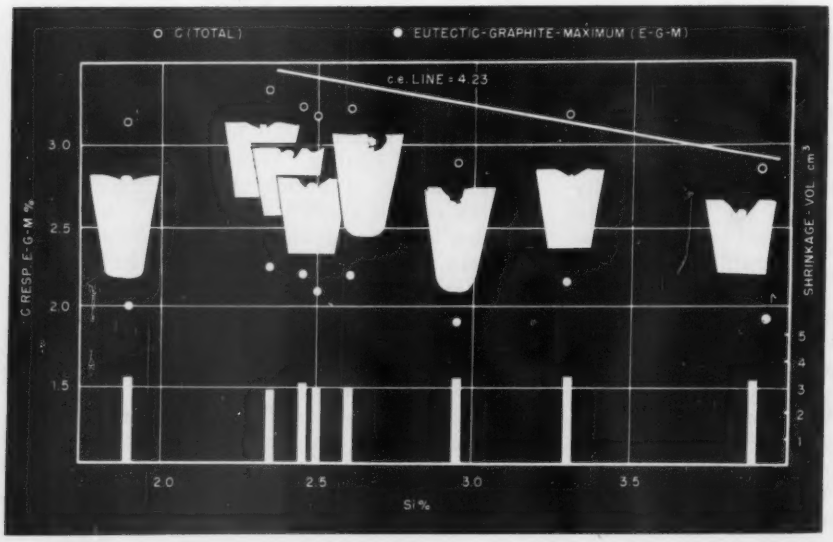

Fig. 7 — Shrink volume remains practically the same when silicon content is varied and EGM is held constant

3. Through application of chills and the like, a partial or complete solidification in the metastable system (ledeburite) can occur and thus too large a shrinkage will be deceptive.

4. With solidification of the molten metal in the shrinkage specimen, the cavity formed during solidification contraction must appear as macroshrink and the test body must show a dense structure.

5. For easy measurement of the shrinkage volume the origin of a surface shrink must be encouraged.

Investigation with Experimental Shapes—In their own systematic experimental series the authors attempted with special consideration of the foregoing principles to develop a most favorable conformation for a shrinkage test.

Examination of the numerous shrinkage test shapes described in the literature shows that none completely answers the projected established demands. The proposed test of C. M. Saeger Jr. and E. J. Ash[5] in shape B in Fig. 3 came nearest to the demands. After numerous individual experiments, the authors proved that this basic form in relation to the size shape (relationship of surface to volume) and pouring method appeared most favorable. However, the trough-shape conformation of the shrink rendered the evaluation more difficult.

Through suitable application of cooling ribs the authors succeeded in an important improvement of this test piece. As Fig. 4 shows, the solidification will be directed through a thin edge rib at the upper rim of test piece and a ring-shaped rib on the upper surface so that a fixation of the shrink as a surface shrink in the top part of the specimen inside the ring-shaped rib will be obtained. If the ring rib is omitted, the flat, valueless conformation of the shrink again results (Fig. 5).

Performance of Shrink Testing—In running the numerous experimental series with this test specimen more than 1000 individual pieces were cast. From those experiments the following optimum conditions were established for obtaining reproducible values:

Preparation: The standard mold, Fig. 4, consisting of two halves and a basin core, is made of core sand. After clamping the halves and placing a light load on the basin core (with four vents), it is ready for pouring. The core sand mixture and the baking temperature both should be as uniform as possible for all molds so that a similar cooling rate always is assured.

Pouring: By pouring with a preheated hand ladle under proper filling until eventual overflow at the basin flow-off, the ferrostatic pressure will be most uniform. The pouring temperature must be adapted to the influence of the melt composition upon the liquidus temperature, Fig. 6. The investigations show that with carbon equivalent values of 3.3 to 4.4 a constant pouring temperature of 1350° C (2460° F) can be employed.

For strongly hypoeutectic melts with increased separation of primary solid solution, a pouring temperature about 100° C (212° F) above the liquidus line is approved. On the other hand, with hypereutectic melts, steeply increased pouring temperature must be employed because kish graphite is liberated at elevated temperature. Application of the test, therefore, is restricted to alloys with a carbon equivalent up to 4.4. The pouring temperature (measured with a platinum-platinum-rhodium thermocouple with quartz protection tube) was maintained with an accuracy of ±5° C in the investigation.

Evaluation: After cooling, the specimens were shaken out and cleaned, the ring-shaped rib knocked off, and the rest removed by a grinding wheel. The volume of the surface shrink of the specimen was measured by trickling in water and wetting agent from a burette (filling speed about 0.1 cc per second.) Complete filling of the shrink as well as the dendritic interstices at the bottom is secured by addition of a wetting agent in combination with a favorable filling speed.

Experiments with the Modified Shrink Piece—Applicability of this shrink test was convincingly proved in another work carried out by A. Wittmoser

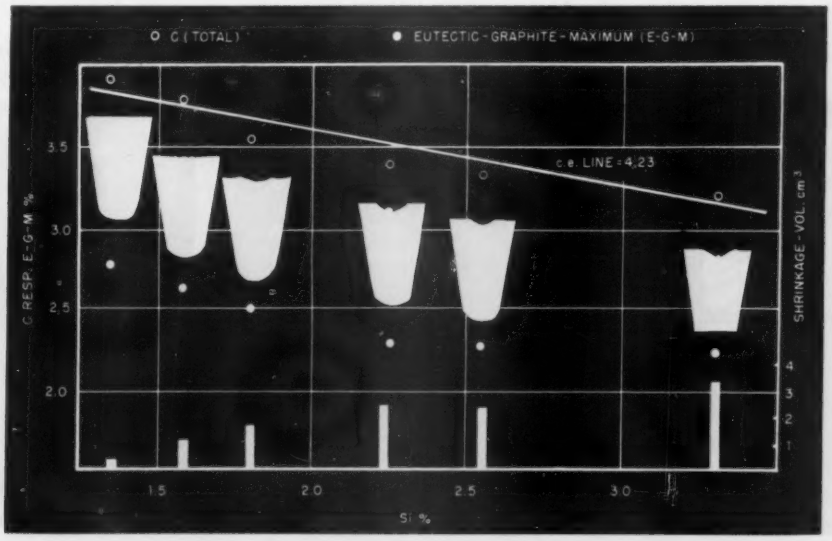

Fig. 8 — Shrink volume becomes greater as the EGM is decreased while the carbon equivalent is held constant

and H. Krall[6].

An initial charge of 65 per cent hematite pig iron and 35 per cent rustfree rail steel was melted in a Tammann furnace (10 kg). The adjustment of silicon content was accomplished through addition of 75 per cent ferrosilicon and the carbon content through charging of ground electrode carbon (98.8 per cent C).

In the series A the calculated portion of the EGM was held as uniformly as possible, and only the silicon content was varied between 1.8 and 3.8 per cent. Evaluation showed that with constant EGM, the shrink volume remained practically the same (Fig. 7). Hence, the variation of the carbon equivalent between 3.75 and 4.23 is without important influence on shrinkage.

In series B the carbon equivalent was held constant and the value of EGM varied between 2.2 and 2.6. From the compiled results in Fig. 8 it can be recognized that in spite of the constant carbon equivalent, the decrease of EGM from 2.6 to 2.2 is accompanied with an increase of the shrink cavity from 0.2 to 3.2.

These experiments show clearly that only in the eutectic region is the precipitated graphite volume of decided significance in shrinkage of cast iron.

For practical service the foregoing investigations give the following rules: Provided the required quality properties permit, the composition of the melt for the casting with shrinky sections is chosen so that the calculated eutectic graphite volume is at least 2.3 per cent, possibly 2.5 per cent. In setting this value, however, the carbon content must be kept as high as possible and the silicon content as low as possible.

Outlook—The described theoretical considerations and practical results show that the shrinkage phenomenon in cast iron is related closely to graphite formation in the eutectic region. Investigation of the shrinkage of cast iron can give not only the required molding and pouring stipulations for a known alloy, but also makes possible certain conclusions about the graphitization process during solidification of the alloy.

One theoretically richly informative example also offers the comparison of the shrinkage decrease of cast irons with lamellar graphite and with nodular graphite. With the same saturation degree and the same value of the calculated Eutectic-Graphite-Maximum, cast iron with nodular graphite shows a substantially greater shrinkage than cast iron with lamellar graphite (Fig. 9). It is remarkable that the measured value for the nodular graphite iron almost exactly corresponds to that of completely graphite-free white cast iron. Accordingly it appears that in nodular graphite cast iron (as in white cast iron) no graphite precipitation occurs in the final crystallization phase (consequently in the eutectic solidification period) of shrinkage formation.

This observation can be considered as further experimental support for the advocated interpretation of A. Wittmoser[7,8] that the formation of nodular graphite only ensues in the solid state from the carbon supersaturated solid solution. Finally, it is pointed out that the shrink test in the described shape also may be suitable for the shrinkage testing of other technical cast alloys. Key research with cast steel and metal alloys can confirm this (Fig. 10). Hence it would be interesting to prove some day to what extent at this point the employment of the shrink test can contribute to the amplification of existing knowledge.

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Fig. 9—Lamellar graphite iron, top, shows less shrinkage than nodular graphite iron, bottom

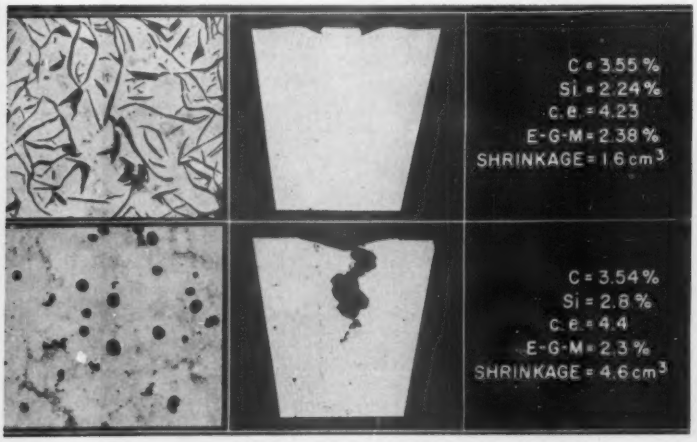
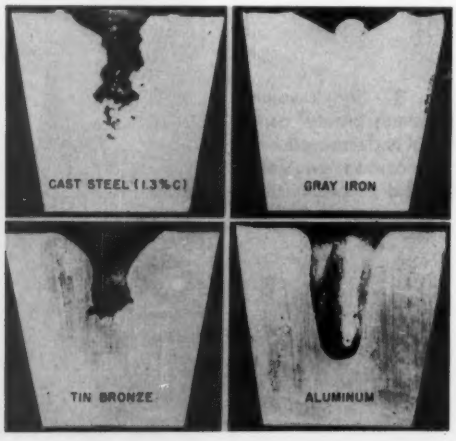


Fig. 10—Shrinkage volume in other alloys cast to the suggested test shape is portrayed here



Meetings of supervisory personnel were the first step in setting up a program which reduced scrap from off-analysis heats more than 60 per cent in only three months

Preventing Off-Analysis Heats

Through Methods Improvement

At Electric Steel Foundry Co., Portland, Oreg., scrap from off-analysis heats was reduced more than 60 per cent in three months. This article relates what was done and how the company achieved it

By HAROLD M. GOWING
Electric Steel Foundry Co., Portland, Oreg.

PRODUCTION of high-alloy castings to meet the rigid demands of the atomic-rocket age has been a challenge to steel foundries since the early 1940s. Castings that will withstand tremendous heat, stress, strain, impact, abrasion, and corrosion require precise alloy composition and improved physical characteristics. The problem is to make every casting and every heat to exacting specifications.

The wider the variety of high-alloy steel castings produced, the greater the problem. Electric Steel Foundry Co. produces probably a wider variety of such alloys than any foundry in the country. Thus a certain amount of scrap from off-analysis heats is to be expected.

During the first phase of a determined antiscrap campaign, we reduced scrap from off-analysis heats more than 60 per cent in three months. This cut reversed an upward trend extending over several years. The company has now taken additional steps to reduce even further the problem of off-analysis castings. What was done to accomplish this result—and particularly *how* it was done—may be of interest to other foundries who suspect they are having too much off-analysis scrap.

In this foundry, as in most others, a careful record of scrap sources has been maintained for many years. These scrap causes not only are watched carefully, but are analyzed each month. This approach in most instances has proved effective in keeping down losses.

While working consistently on *all* scrap causes, we select one or more causes each month for particular attention, especially if the cause shows any noticeable increase. In one such scrap session, it was decided to concentrate again on off-analysis heats, which, despite all previous efforts, had been creeping up steadily. In this instance, top management decided that definite additional action should be taken to reduce it.

Pride at Stake—Many firms, faced with similar situations, have pulled in outside experts or made drastic organizational changes, with varying degrees of success. Often, however, the amount of success achieved turned out to be more than offset by hurt pride, lowered morale, lack of confidence, and a feeling of insecurity on the part of the firm's own staff. Because our people take pride in their work and in their ability to produce quality products, any challenge to this philosophy stimulates im-

mediate action. The off-analysis problem was no exception.

Foremen Show the Way—The first breakthrough grew out of a series of weekly foremen's conferences. They were conducted at about this same time to train 27 supervisors on how to conduct a problem-solving conference.

Company executives were impressed by the way the foremen's groups applied their combined thinking power to find workable solutions for various problems, and it was decided that perhaps a similar approach could be used to help solve the off-analysis problem.

A project head to work with the group was selected, and as a result of a supervisors' meeting, a three-phase outline was worked out, forming the following basis for the program:

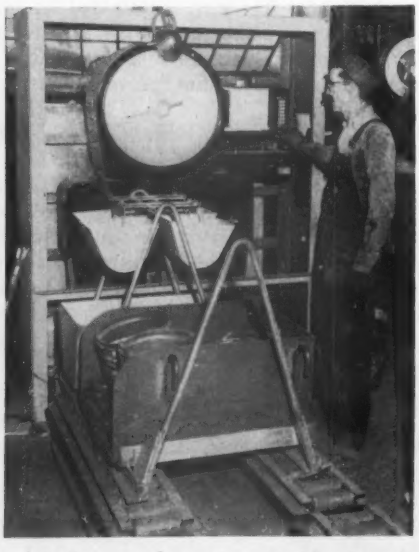
Phase One—Job breakdowns were made of every step of the process, starting with calculating the heat, making up the heat log, making up the furnace charge, and melting and refining the metal.

A careful analysis was made of all scrapped heats during the preceding 15 months. Probable reasons for these out-of-range heats were carefully tabulated and studied.

Phase Two—A meeting was called of all supervisory personnel connected with the metallurgical and melting phases of the business. For more than two months this group met at least once a week. The project leader spent practically full time on the problem during this period, and various members of the group worked out specific phases of the project outside the meetings. These sessions took several forms.

First, the job breakdowns formed the basis for a careful analysis of all steps in the process from start to finish.

As these sessions progressed, it became more and more apparent to all members of the group that the processes, procedures, and methods involved in manufacturing high-alloy steel castings offer literally hundreds of chances for error.



Complete furnace charge in a new heat carrier is weighed up on positive print-weight scale. Each alloy is in a clearly marked separate container

It was found that in the past many manual checking operations had been set up to halt the off-analysis castings. In fact, even the checkers were checked in many instances, and the act of checking had become a perfunctory process.

These studies convinced the project group that the system itself was one of the main causes of the trouble—and perhaps one of the first things that should receive attention. There also was a definite feeling that the complicated system in use could be simplified by the installation of certain new equipment.

Brainstorming Sessions Used—This development led into a brainstorming session in which many new ideas came to light. The ideas included revision of certain paperwork forms; creation of a much improved, central heat make-up area; and installation of a direct-reading spectrograph to give complete analysis (except for carbon) of a steel sample in a few minutes. This device provides the exact alloy content of the metal before it is poured into the molds and eliminates holding up batches of castings for a day or so awaiting lab analysis.

The Best Solutions—The group then turned its attention to simplifying procedures and processes. These studies were confined to three areas: Paperwork, making up the heat, and melting.

In the paperwork sessions, all forms were checked carefully and a number of them revised to eliminate duplication and reduce chances for error. A girl clerk was hired to do calculating work and release control men for closer follow-up of the heats. A large score sheet was devised to record the reasons for off-analysis heats, showing exactly where they had happened, why, and who was responsible.

In the "making-up-the-heat" sessions, all types of equipment were studied, and a rough drawing made of a suggested central heat make-up area. But because heats were made up in three widely separated areas of the plant, it was decided to confine the proposed new heat make-up area to one location only—the area where the most critical heats were poured and, incidentally, where most of the errors were occurring.

Many ideas for improvement of this operation were brought out and recorded in the minutes of the meeting.

These ideas included such things as the following:

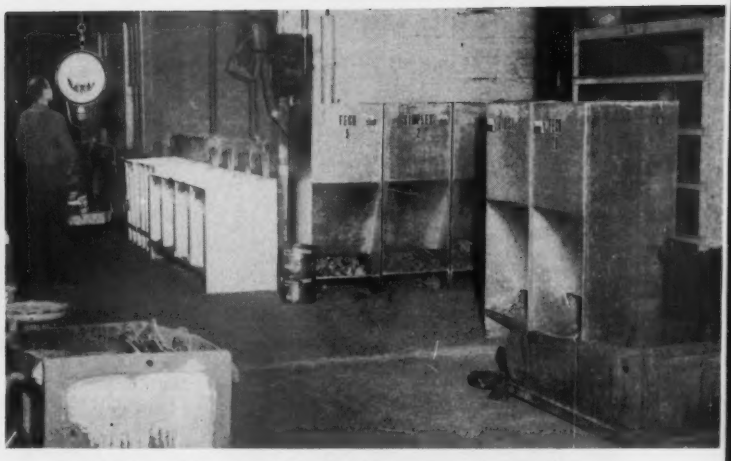
1. Installing print-weight scales to record the exact weight of each element used.

2. Using carriers to keep all ingredients together so that checking would be simpler and no elements could become lost or misplaced.

3. Installing alloy bins—tailored to hold about a week's supply of the various alloys and marked plainly to eliminate mistakes—and racks to hold returns and make them more accessible and easier to inventory.

Group Report—The last few sessions were devoted to boiling all the ideas down to specific recommendations. About three months after the program started, a report was submitted to man-

Pigeonhole parking of returns boxes saves valuable space in the heat make-up area



Section of improved heat make-up area shows orderly arrangement of the alloy bins and traveling scales

agement recommending, among other things, that the company take these steps:

1. Install a direct-reading spectrograph to enable the lab to make a complete analysis of each heat before it is poured and to facilitate correction if necessary.
2. Install the improved heat make-up layout.
3. Improve material handling.
4. Conduct a 20-hour training course for all melters and helpers.

The melter training course was approved, and the other recommendations were held up pending further investigation.

Phase Three—The group then turned its attention to working out details of a training course to 1) train each worker on all phases of his job and 2) to acquaint him with the details of other related functions.

Seven of the nine men in the conference group were assigned as instructors to conduct sessions in their own particular operations. This meant that each one had to make up his own text material, props, etc., and arrange his complete session. All agreed later that this experience gave each one a much better understanding and appreciation of what his workers are up against in their day-to-day work.

The three-hour sessions were conducted on company time on Saturday mornings. The 40 workers divided into two groups, which met on alternate weeks. The sessions included lectures, demonstrations, and discussions of the fundamentals involved in melting.

Large score sheets were displayed prominently at each session so that each workman could see how things were going. Each deviation was checked carefully with the individual or individuals responsible. This practice still is in effect.

Many of the men seemed surprised that some little thing they did or didn't do would result in an off-analysis heat. This possibility prompted them to take more interest in the sessions. They asked questions, made suggestions, and helped to iron out problems.

Starting almost immediately after the first few sessions, off-analysis heats started downward. By the end of the three-month period required to conduct the sessions, it was reduced well over 60 per cent and has continued below that figure.

The heat make-up area has been installed and is working most satisfactorily. Material handling has been improved. A direct-reading spectrograph has been installed. It may not eliminate all off-analysis, but will prevent metal being poured in expensive molds and, in most instances, will enable the metallurgist to correct the alloy content so the heat can be poured.

Other Benefits—The dollar savings accomplished by this program are substantial, but the company feels that the intangible benefits are just as important, possibly more so. Since everyone from the workmen up has had an active part in the project, they can all take credit.

After the sessions had been completed, many workmen wanted to know where they could learn more about metallurgy. There were so many, in fact, that the company felt something had to be done about it.

When it was found that no school in the area offered a course in basic metallurgy, arrangements were made with a junior college to set up a night school course especially for our employees. Our metallurgists worked with the school staff in selecting text material.

The college was swamped by more than 70 applicants on opening night. Employees attended these classes once a week for 12 weeks on their own time and paid their own tuition.

Electric Steel's management is gratified with the benefits of this scrap-reduction program. It is especially pleased that these results have been accomplished with everyone's confidence and self-respect intact. The whole experience proves, management believes, our motto that "a confident team makes a quality product."

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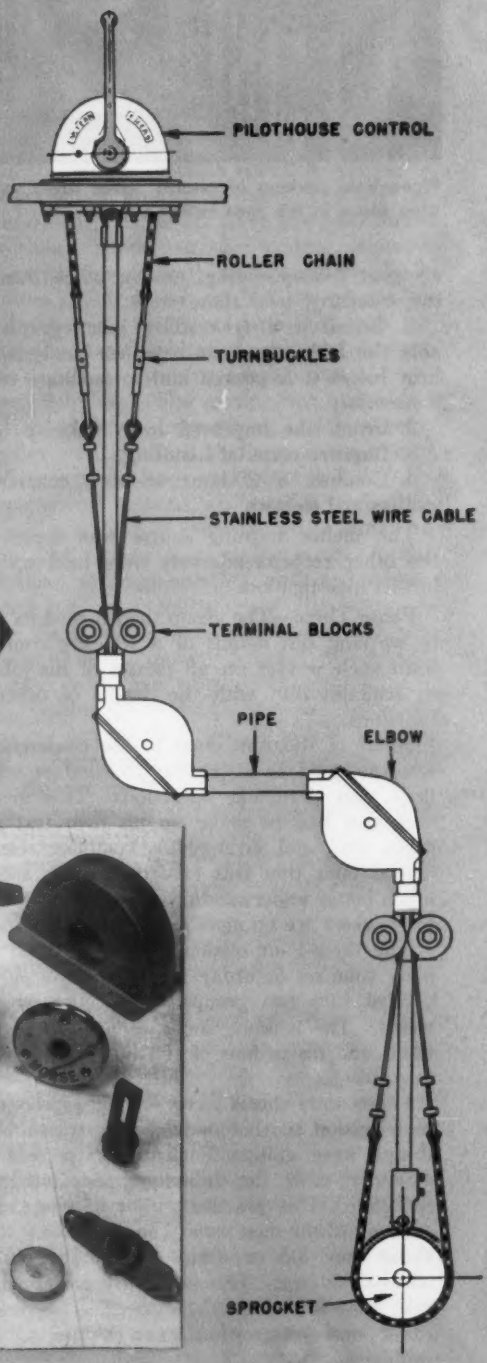
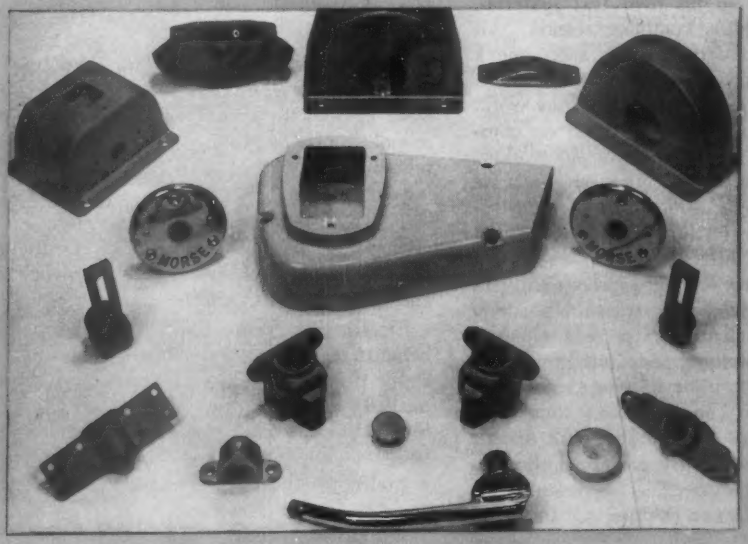
Shell Molding

Assembling an array of chromium-plated bronze pilothouse controls preparatory to placing in boxes for shipment



Diagrammatic representation of one type of control system showing the principal units. Castings are used in the pilothouse control, terminal blocks, and elbows

Shell molded castings used in the control systems include housings, elbows, levers, terminal blocks, mounting boxes



Solves Castings Problem

At Morse Instrument Co., shell molding proved the answer to production of bronze castings suitable for chrome plating or buffing to a high luster. Shell molded aluminum castings also are made

By EDWIN BREMER
Metallurgical Editor

A COUPLE of years ago, Morse Instrument Co., Hudson, Ohio, manufacturer of photographic and marine equipment, became interested in the shell molding process as a means of producing castings for its marine equipment. Bronze castings had to be either chrome plated or buffed to a high luster, and difficulty had been encountered in obtaining suitable castings. Some of these parts are shown in Fig. 1 and 2.

The castings are part of remote control devices employed in combination with flexible stainless steel cable on pleasure craft and on ships. In pleasure craft of both outboard and inboard motor types, the equipment is used to control motor operation. On ships, similar but more rugged devices are employed to control winches and other equipment. Fig. 1 shows the assembly line for one type of chrome-plated pleasure craft controls. Some of the castings are shown in Fig. 2 and include housings, cable elbow and cap, mounting box, escutcheons, control arms, terminal blocks, cable clamps, and control lever. One arrangement for the control of an inboard motor is shown in Fig. 3.

Close Control Required—Production of castings to be plated or buffed requires close control at all times. Exterior surfaces must be as smooth as possible to hold polishing operations to the minimum. Additionally, the surface must be relatively free from such imperfections as pits, seams, fins, etc., since their removal often results in cutting through the dense, fine-grained casting skin to the coarser structure which is less amenable to plating and buffing.

The greatest difficulty encountered is the presence of pinholes or porosity, just under the casting skin, which is revealed during the polishing operations. They range from extremely fine to appreciably large and usually are caused by gas absorbed during melting, although they may result from metal-mold reaction or occasionally from insufficient feeding.

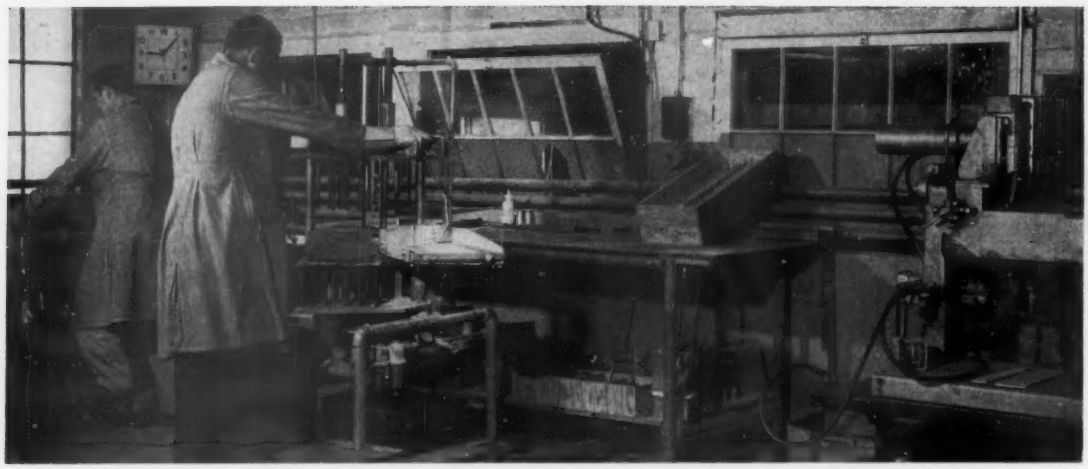
Unfortunately, many of these defects are not visible until the polishing operations are performed. Consequently, constant vigilance and close control must be exercised to insure consistently uniform castings to meet requirements of electroplating and buffing.

To Morse Instrument Co., the general practice of using fine sands in the shell molding process indicated that it would answer the problem of smooth surfaces on castings. Information also indicated that with suitable pattern equipment, castings could be held to close dimensional tolerances, thus offering the possibility of minimum machining. Further, the process appeared to be a relatively simple operation which could be carried on by personnel with average skill and intelligence. Rightly, the problem of pinholes and porosity was considered to be a problem apart from molding which could be eliminated or minimized by good melting control.

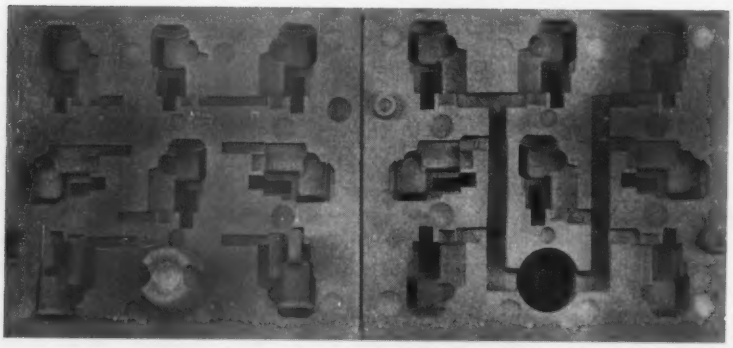
Experimental Work—Following visits to a number of foundries conducting shell molding operations to gather information at first hand, and to consolidate its thinking on the practicability of applying the process to its own castings, the firm decided to try shell molding experimentally. Since the castings are small, a simple, manually operated, dump-box machine was purchased and installed in the rear portion of a 50 x 50-ft building across the street from its main plant. Other equipment included a small, portable mulling machine for preparing the resin-coated sand, and a gas-fired crucible furnace.

The firm constructed its own mold assembly or shell-closing unit, which is shown at the left in Fig. 4. Having little experience in castings production, the company encountered many problems but gradually overcame them. Results obtained indicated that the shell molding process would produce castings especially suitable for electroplated or buffed finishes. About a year and a half ago, castings production began on a permanent basis. Additional equipment purchased included a machine for producing hollow cores and a Tocco high-frequency electric induction furnace.

The shell molding machine is equipped with dump boxes at opposite ends to invest cope and drag pat-

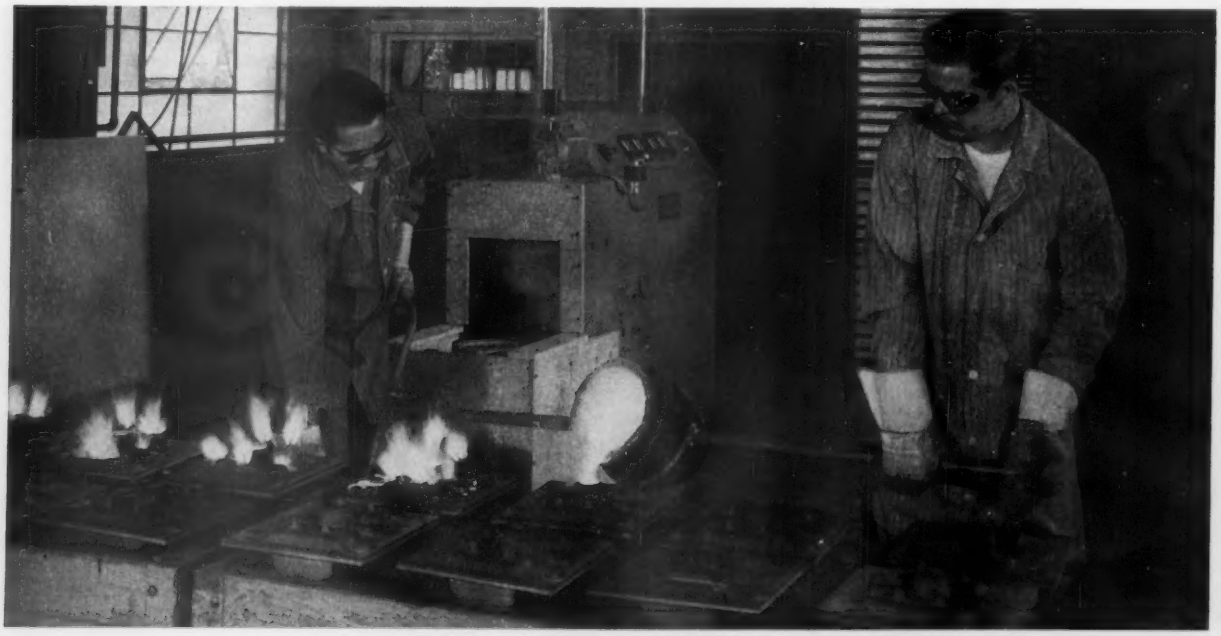


View across the foundry. Shell molding unit is at far left, the mold assembling unit is in the center, and the shell core machine is at the right



Drag and cope shell halves will produce eight terminal blocks. Cores are shown in lower cavities in the drag

Molds are set out on boxes filled with sand which bring them about 30 in. above the floor level. A high-frequency induction furnace provides the metal



terns. A gas-fired curing oven is in the center. Half molds are made alternately, one being invested while the other is cured. Patterns are constructed of aluminum in the firm's plant, and excellent results are reported. They are invested with resin-coated sand, and the dwell time is varied according to the thickness of shell desired. For 3/16-in. shells, dwell time is 8 seconds; for ¼-in. shells, 10 seconds; and for heavy shells ⅜ in. thick, 15 seconds. Shells are cured at 450° F for 16 to 30 seconds, depending on the thickness.

Following curing, the drag shell mold is removed from the pattern and placed on the assembly or closing unit, and a small amount of dry resin is vibrated onto the surface through a perforated plate. The arrangement of holes in the plate is such that the resin is deposited at various points close to the cavities to provide a tight joint when the cope half is placed in position and clamped. Fig. 5 shows the drag and cope molds for producing terminal blocks, with cores in position in two of the cavities.

After the jointing resin has been cured, in about 10 seconds, the assembled mold is removed from the closing unit and placed either on the sand-filled boxes shown in the foreground in Fig. 6 or in racks which can be seen in the right background of this illustration. Usual schedule of production is for the two operators to make about 30 molds. At that time the bronze previously charged into the furnace crucible has melted and is up to pouring temperature. Molds then are poured and the cycle repeated.

The high-frequency furnace, shown in the central background of Fig. 6, is a motor-generator type of 30-kw capacity handling a No. 30 crucible, which holds about 90 lb of bronze. Aluminum alloy castings also are made, and metal for them is melted in a gas-fired crucible furnace handling a No. 50 crucible, which holds 50 lb of aluminum.

When the castings have solidified, the molds are removed from the pouring station, shaken out on the floor a short distance away, and inspected. Then they are taken to an adjoining room where gates and risers are removed on a bandsaw. Gate and riser stubs are removed on grinders or polishing belts. When necessary, the castings are subjected to abrasive blasting. Cleaned castings are forwarded to the machine shop for any machining operations. Castings to be electroplated or buffed are sent to an outside source for those operations.

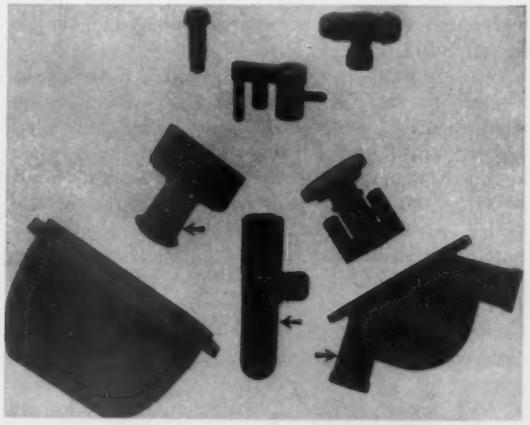
Sand Mixing—Sand used for making molds and cores at Morse Instrument Co. is a clay-free silica type with an AFS fineness number of 117. It is coated with 4½ per cent resin by the wet method. Sand is prepared in 100-lb batches in a portable muller equipped with a blower. Procedure is to add the dry resin to the sand and mix for about 2 minutes. Then a mixture of 17 oz of alchohol and 5 oz of water is added, and the sand is mulled for about 2 minutes. The blower is turned on, and mixing is continued for about 10 or 12 minutes, until the sand has dried.

Hollow resin-bonded cores are made on a manually operated machine shown in Fig. 7. Some of the cores are depicted in Fig. 8. Attention is directed particularly to three of the cores indicated by the arrows. As may be observed, they incorporate ¾-in. standard iron pipe threads. Castings in which they are used do not require any tapping or chasing since the threads formed are sharp and true to form. No difficulty is encountered in obtaining watertight joints when the pipe is pulled up snug.

As might be expected, the practicability of casting in threads through use of the shell molding process has eliminated expensive reaming and tapping operations. Additionally, the process permits close control of dimensional tolerances. That control has resulted in reduction of other machining operations or in production of castings with thinner wall sections or in both.

Hollow cores used in some castings are produced rapidly on a manually operated machine

Some of the hollow cores made on the machine at left. Arrows indicate pipe thread areas



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Maintenance of ... Fluid Power Components ...

Properly maintained fluid power equipment will provide you with efficient operation for a long period of time. Here are some suggestions which can help you to avoid equipment breakdowns

By HARRY L. STEWART
Chief Sales Engineer
Logansport Machine Co., Logansport, Ind.

IT GENERALLY is agreed by experts in the pneumatic and hydraulic component field that dirt and heat do the most damage to those mechanisms. Dirt is especially harmful, and it is present in many forms in foundry operations. Caution therefore should be used in the installation and maintenance of fluid power equipment if the components are to perform satisfactorily and give troublefree operation over a long period of time.

A good system of preventive maintenance also should be established and followed. To help the maintenance and installation departments cope with pneumatic and hydraulic problems, checklists should be set up by supervisors, and checks should be made at regular intervals.

Power Unit—The most important part of the hydraulic system is the source of hydraulic power—that is, the hydraulic power unit. This unit is made up of the hydraulic pump, oil reservoir, electric motor, motor coupling, relief valve, pressure gage, filter, and necessary internal piping. It also may incorporate a heat exchanger and controls, the motor starter, an accumulator, and a control panel. Elaborateness of the installation often depends on the application.

When the power device is installed, it should be located in a well ventilated spot, easily accessible for maintenance. Too often the unit is placed in a pit without ventilation and quickly overheats. It should be on a firm foundation, similar to that shown in Fig. 1, so that air can circulate around it, and should be as near as possible to the machine it is serving. Installation should be such that it can be picked up with a fork truck or a portable crane. The reservoir should be lower than the valving in the system to permit the oil to drain back to the reservoir without causing any back pressure in the system.

Most power devices have cleanout plates located in the reservoir; these should be unobstructed. Leave plenty of room so that the cleanout plate can be removed. When the cleanout plate is removed, be sure to check the gasket and to replace it if necessary. A bad gasket may result in a leak which not only causes loss of expensive hydraulic oil, but also creates a slippery spot on the floor and causes a fire hazard. Be certain that the cleanout plate bolts are tight.

The unit should be protected from direct blasts of hot air or flames. Keep the ambient temperature as near normal room temperature as possible. It may be necessary to build a baffle of heat-repellent material between the unit and the heat source. Do not place the unit above the system. Doing so makes it difficult to service, causes back pressure in the lines, and allows rising fumes and dirt to collect on it.

Pump Maintenance—The pump is the vital part of the power device. To produce the high pressures required, pump parts must be fitted with very little clearance between them. Dirt or extreme heat may cause the pump parts to score and the pump to freeze up. Dirt entering the pump often is caused by someone's removing the intake filter and allowing the pump to operate without the filter. The pump should not be operated without a filter unless the oil has been filtered before it enters the pump suction line.

Pumps often become noisy through no fault of their own and may fail to operate properly although nothing is wrong with them. Before replacing a pump, make these checks:

1. Check the intake line. If it is loose, air being drawn in will cause cavitation within the pump. To check this possibility, squirt a little oil over each joint of the intake lines. If the noise ceases, the intake line is loose.

2. Check the intake filter for dirt. A dirty filter

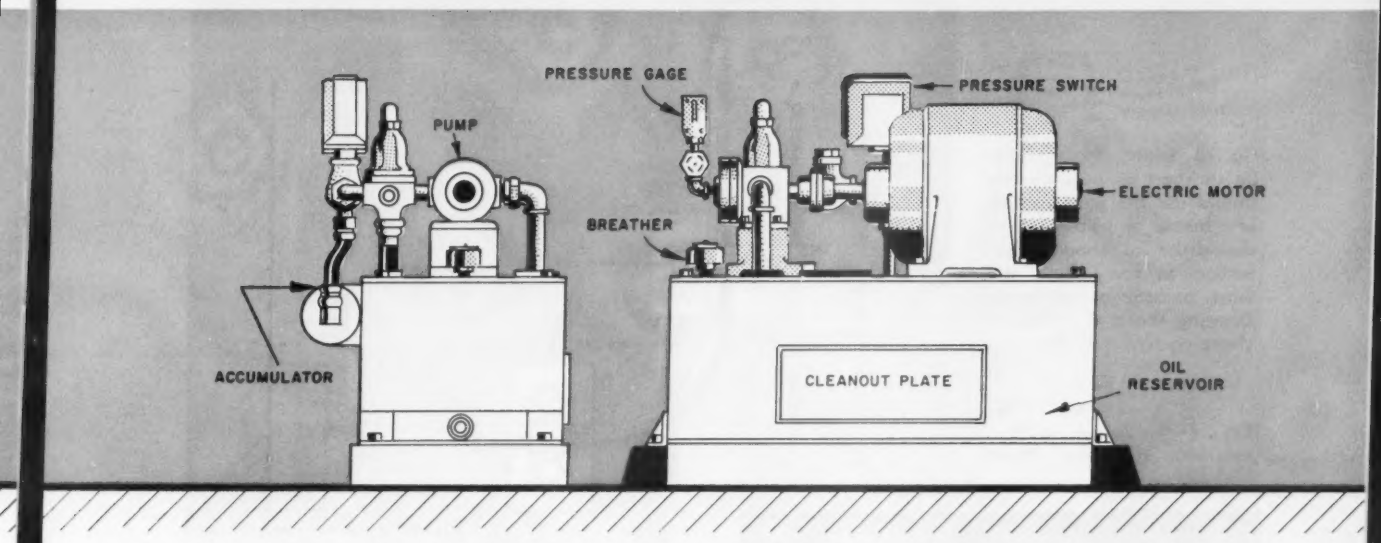


Fig. 1—Hydraulic power unit should be situated in a well ventilated spot, on a firm foundation, easily accessible for maintenance

or one which is too small starves the pump and causes noisy operation.

3. Check alignment between pump shaft and motor shaft. Misalignment causes considerable noise and ruins pump bearings if it is not corrected. It also causes a considerable amount of heat within the pump.

4. What sounds like pump noise may be noise caused within the relief valve transmitted back into the pump.

5. Failure of the pump to register pressure on the pressure gage may be caused by a broken spring in the relief valve or by a sticking spool in the relief valve.

6. Check the rotation of the pump shaft. If the shaft is revolving in the reverse direction, pressure will not build up, nor will the pump produce any fluid.

7. Pumps fail to produce pressure if there are any open spots in the system, such as an open center valve that fails to shift.

Although the pump delivers a fluid that has high lubricating qualities, it is necessary to lubricate bearings not contacted by the hydraulic fluid. Follow closely the recommendations of the pump manufacturer. Some recommend a sodium grease for the bearings.

When installing a new pump, remember that it is a precision part. Mount it securely on a firm base, tighten the pipe securely (but not enough to distort the pump body), align the pump and the motor shaft carefully, and do not allow the pump to sit around with the ports open so that dirt and dust can enter.

When installing lines to and from the pump, use lines of sufficient size. Usually the inlet line is one pipe size larger than the outlet line. Both lines must be clean and free of scale, dirt, and rust.

The coupling between the pump and the electric motor should be protected as much as possible from dirt and falling objects. When considerable dirt and grit are in the air, teeth on a chain-type coupling become badly worn. This wear can be eliminated by using a casing coupling with dirt seals and by lubricating the coupling at regular intervals. Coupling guards similar to that shown in Fig. 2 often are used for protection against falling objects or for protection to working personnel.

Power Unit Protection—After the power device has been put in operation, the line to the pressure gage should be closed. This precaution protects the pressure gage from pulsations and vibrations within the system. Open the gage only when making pressure adjustments in the system, and it will perform satisfactorily longer. Gages also should be protected to eliminate sudden shock pressures to precision working parts. Many gages are made inoperative through carelessness.

Cleaning of the hydraulic power device is important. It should be thoroughly flushed and cleaned. Maintenance men should be cautioned about wip-

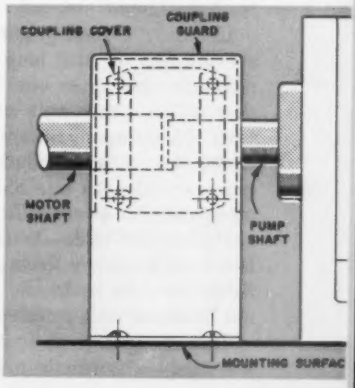


Fig. 2—Coupling guard often is used for protection against falling objects and protection of working personnel

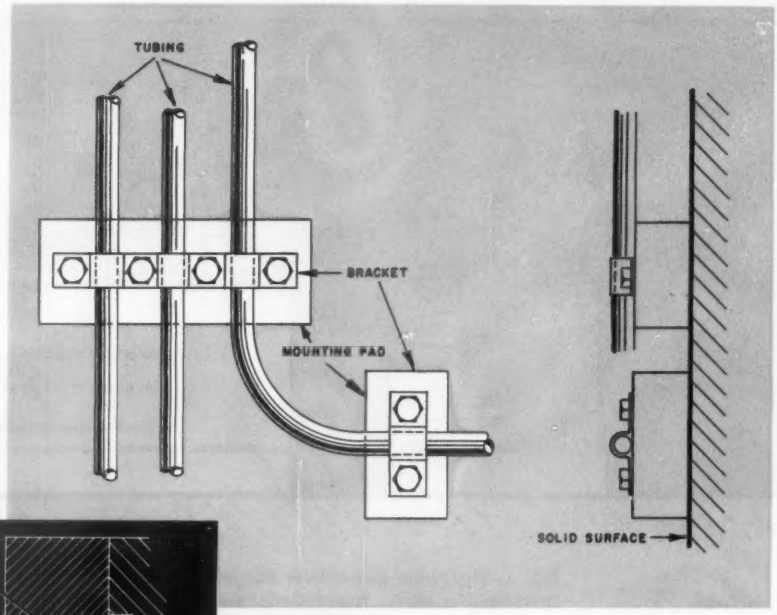
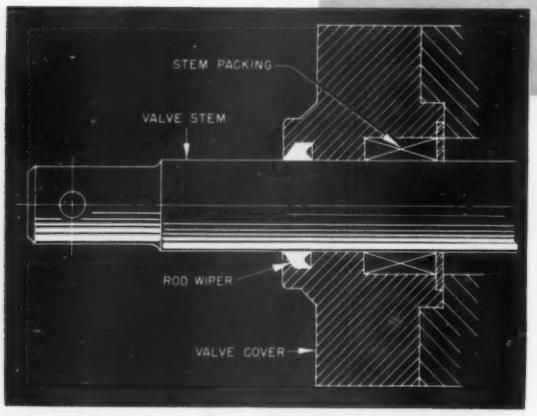


Fig. 3 (right)—Piping must be as short as possible and should use the least number of bends possible. Lines should be of enough cross section to carry fluid with least amount of resistance. Drawing shows a method of clamping hydraulic lines

Fig. 4 (below)—A wiper is one way to reduce scoring



ing out the reservoir with dirty rags which contain lint or ravelings. Such rags usually leave particles in the reservoir which quickly clog the intake filter.

When the oil reservoir is filled, several things should be considered: 1. The reservoir must be clean —free of rust, scale, and other impurities. 2. Gasketed cleanouts and plugged connections on the reservoir must be leakproof. 3. The oil must be clean. Hydraulic oil should be stored in clean containers with closed tops so that foreign matter cannot contaminate it.

Use only a good grade of oil. Higher priced oils are cheaper in the long haul. Mixing oils is not recommended since one oil may have an additive that will not mix well with that of another. Check with the pump manufacturer or with a reliable oil dealer for recommendations. One pump may require an oil with one SSU rating, whereas another pump calls for a very different rating.

Hydraulic Fluids—With much stress being put on fire hazards, many firms are turning to fire-resistant fluids for their hydraulic systems. Such fluids should not be mixed with petroleum oils.

Two categories of fire-resistant fluids commonly are used—a synthetic mixture and an aqueous-base solution. Aqueous-base fluids use additives and inhibitors which produce antiwear qualities, corrosion resistance, and lubricity. Temperatures of these fluids should be kept fairly low, somewhere around 125° F. Petroleum-base fluids work well up to 160° F, but 140° F usually is recommended.

When aqueous-base fluids are used, the reservoir should be stripped of ordinary paint and sealers and be replaced by lacquers and enamels that will not be affected. Aqueous-base fluids also attack zinc, cadmium, some types of packings, and other materials. They usually require a filter different from that used for petroleum-base fluid.

The synthetic mixture used for hydraulic service performs well from 120° to 140° F. These mixtures include chlorinated hydrocarbons, phosphate-base fluids, and others. Phosphate-base fluid often causes the coating in the reservoir to peel or dissolve. It also has an adverse effect on many packings, and a suitable packing material must be selected to be used with this material. Teflon, nylon, silicones, and butyl rubber work well, but leather impregnated with rubber or waxes is troublesome.

When oil is transferred from permanent storage to a bucket or container for transport to the oil reservoir, be certain that this container is clean. Extra precautions for cleanliness at permanent storage and at the reservoir are meaningless if the transport container is an old bucket coated with dirt.

How often oil in the reservoir should be changed depends on such factors as heat, impurities in the air, impurities in the system, sudden temperature changes which cause condensation, cutting fluids entering the oil, and severity of service. Have your oil dealer check a sample of your oil. He should be able to advise you as to when to change it.

Piping—In piping up a hydraulic system or a pneumatic system, use care in selecting the piping

for the job. Select the pipe or tubing that will handle the pressure of the system amply. Be sure that the pipe is clean and free of scale: New pipe may have scale in it. Whether to use pipe or tubing depends pretty much on the individual's choice. Both work well.

With the new types of flareless fittings, much labor can be saved in piping up a machine. One should, however, have a tube bender for making the bends in the tubing. When piping up a system, follow three simple rules: 1. Make lines as short as possible. 2. Use the least number of bends possible. 3. Select lines of sufficient cross section to carry the fluid with the least amount of resistance.

When high-pressure lines are installed, they should be mounted securely. Otherwise they may whip and fracture. See Fig. 3 for a suggested method of clamping hydraulic lines.

Exhaust Lines—Exhaust lines in a hydraulic system should be of sufficient size to carry the fluid without a buildup of back pressure. Lines the same size as the exhaust connection at the valve should be sufficient. If more than one exhaust line is put into a manifold, however, the manifold section should be equal to the areas of the exhaust lines. Low-pressure piping is suitable for the exhaust lines. Whenever a line is removed from a system, cap the connections to eliminate the possibility of sand or dirt entering the system. Be neat in your piping layout.

Controls—Controls may be a source of trouble if not properly installed. In manually or mechanically operated controls—such as two, three, or four work valves—highly polished stems must pass through packing as the valve spools are actuated. If these stems are scored by abrasion from sand or dirt, they soon will cut the packing and cause leakage. A wiper like that shown in Fig. 4 is one way to reduce the possibility of scoring. Scrapers also are used in many instances. These generally can be installed if the standard valves are not equipped with them.

Valves—When installing valves, keep them away from extreme "hot spots" or at least protect them from hot blasts. Valves are made with precision fits, and if they become too hot the difference in expansion between body material and spool material may cause a seizure. Nearly all valves have some type of packing, and heat is detrimental to packing. In extreme cases, the author has seen valves in which the packing actually had become charred. Packings now are available for higher temperature ranges, but they do not cover all applications. Check the packing properties relative to the application.

Control valves should be solidly mounted. Those with mounting pads should be bolted down on a clean, smooth, flat surface to eliminate any chance of a binding action due to distortion. Mount the valve high enough to allow natural drain back to the reservoir and to prevent its becoming covered with dirt. Mounting at a higher level also reduces the chance of valves being hit by fork trucks, skids, or castings.

When disassembling and assembling control valves, take them to a clean spot and be very careful. Use the best housekeeping possible when working on valves or other components, and be absolutely certain that no sand gets into them. A small particle of sand can cause a valve to freeze. If the valve is not put into service at once after servicing, plug all ports. When a valve is disassembled for servicing, it is well to replace all gaskets and seals since they are minor cost items. Be sure to replace them with recommended parts; inferior packings will cause valve failure.

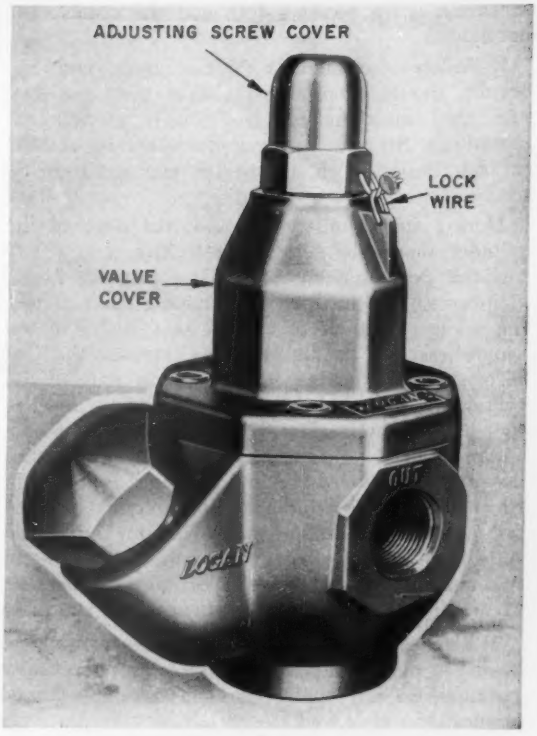


Fig. 5—Lock wire makes it difficult for anyone to tamper with adjustment of valve

Many valves are equipped with threaded covers, adjusting needles, or spring-tensioning devices. If the maintenance man takes them off and lays them down, they may be lost, or dirt may accumulate and get into the threads, causing leaks. Further, operators often tamper with the adjustments if they are easily accessible. The maintenance man should replace the cover and lock it so that the adjustment cannot be tampered with. Many valves are equipped with lock wires. An example is shown in Fig. 5. Operators also have been known to damage malfunctioning valves by hammering on them to make them operate correctly.

Many valve failures are caused because someone forgot to connect the drainline, even though a big, bright tag hooked to the drain connections says, "Remove Plug and Connect to Drain." On hydraulic valves, the drain oil will form the same thing as a solid plug if not relieved. The valve may function the first time or even the second, but then

the drain space becomes full, and the spools cannot move.

Cylinders—Cylinders, both pneumatic and hydraulic, should be protected against sand and dirt, and they must be mounted firmly on suitable mountings. An 8-in. bore cylinder operating at 2000 psi can impact with a force of approximately 50 tons.

During the installation period, the ports of the cylinder should be kept plugged. Any sand entering the ports quickly scores the precision-honed cylinder walls. Installers often have a habit of taking a pipe plug out of a valve or cylinder to use somewhere else on the job, thus exposing the precision parts to foreign matter. Piston rods of the cylinder also should be protected during installation and operation. Fig. 6 shows a method of protecting the rod by using a collapsible boot. A cylinder with a hardened rod and a scraper is shown in Fig. 7. Use the best protection possible, for a scored rod will cut the packing, thus resulting in a leak. A leak in an air cylinder is not quite as bad as in hydraulics, although compressed air is expensive. Hydraulic leakage, however, presents a fire hazard.

When installing cylinders, protect them from hot blasts as much as possible. Use high temperature packings on hot applications. In some pneumatic applications, it is well to use automotive-type rings on the piston instead of the conventional cup packings or synthetic packing.

Alignment is important in the installation of a cylinder. Misalignment of the piston rod causes scoring of the rod, worn bushings, and leaky packings. Misalignment of the trunnion bearings or clevis pins will cause breakage. Operation of cylinders at pressures beyond their capacities also may have an effect on alignment.

In hydraulic systems where excessive heat is present, the use of a heat exchanger is recommended. This device keeps the oil at a safe operating temperature and reduces packing troubles and leakage. It is well to use thermostatic controls to reduce water consumption.

Care must be used in pneumatic systems to cope with condensation. If the pipe lines run through spots with varying temperatures, condensation may form in large quantities. If not drained off, it will cause control trouble. If the air lines run to the outside of the building for operating ramps on shipping platforms, etc., the condensation will freeze in cold weather and make the system inoperative.

Pneumatic systems must be properly lubricated. This point is especially important when ambient temperatures are high. Suitable lubricators should be placed at the entrance of each circuit to afford adequate lubrication to each component. Lubricators will do little good, however, if they are not filled with oil.

In maintaining pneumatic and hydraulic systems in foundries, the maintenance department should follow these points: 1. Use the best housekeeping methods possible. 2. Make regular checks for leaks and repair them when they occur. 3. Keep a stock of repair parts for the various components. 4. Remember that fluid power components are precision pieces of equipment and should be handled accordingly.

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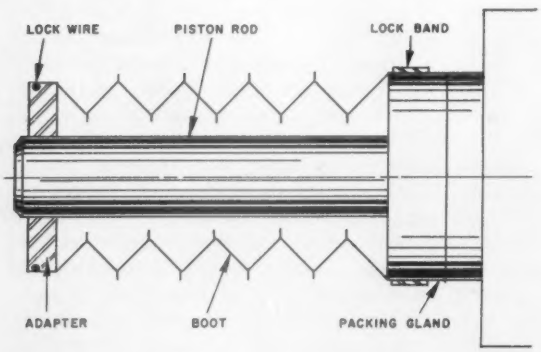

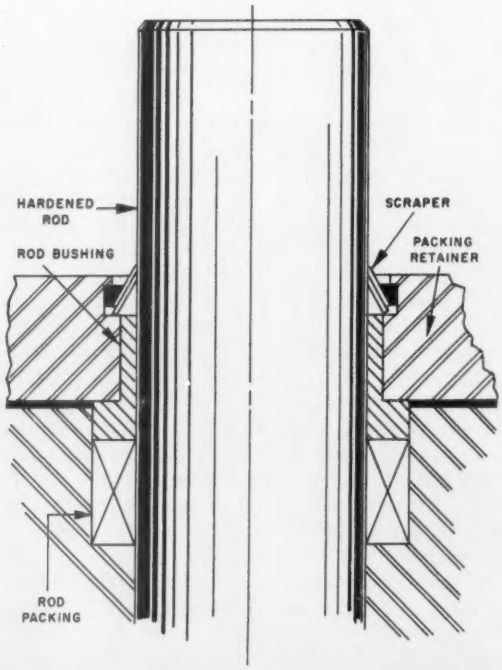

Fig. 6 and 7—Cylinder piston rods should be protected during installation and operation. Fig. 6 (above) shows method of protecting the rod by using a collapsible boot. A cylinder which employs a hardened rod and scraper is shown in Fig. 7, at the right

Diecasting Assembly Operation

Cuts Costs and Improves Quality

By PAUL L. DESCHENES

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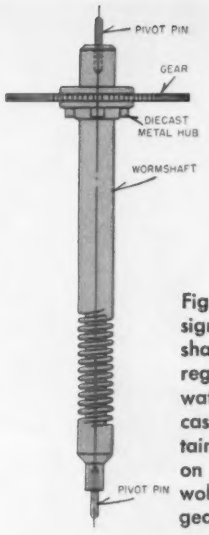

Fig. 1—Sketch of redesigned gear and wormshaft assembly used in register mechanism of watthour meters. Diecasting of hub maintains close tolerances on concentricity, gear wobble, and location of gear on the shaft

AN automated diecasting operation has cut costs and improved product quality in the manufacture of watthour meter components at the Somersworth, N. H., plant of General Electric Co.

Gear and Wormshaft Assembly—The register mechanism of the watthour meter includes an assembly which consists of an aluminum gear 0.020 in. thick, an aluminum wormshaft ⅛ in. in diam with stainless steel pivots pressed in each end, and a hub (Fig. 1). Performance requirements demand close tolerances with respect to gear OD, wormshaft pivot pin concentricity, gear wobble, and location of the gear from the end of one of the pivot pins.

In the original method of manufacture, a brass hub was staked to the gear, the hub was bored, and the gear and hub assembly was staked to the wormshaft. In the new operation, the hub automatically is diecast in place by a special machine with an output of 1000 assemblies per hour. The hub is cast in babbitt metal, a lead-base alloy.

Wormshafts with the pivot pins pressed in are fed automatically from a magazine into one half of the diecasting mold. Gears are supplied to the other half of the mold from a vibratory feeder.

When the feed mechanisms for the magazine and the feeder have been actuated, the mold closes. Probes then sense the presence of parts and check that they are positioned properly. If, for example, a pivot pin is missing or is loose in the wormshaft, the cycle stops. It will not continue until the defective part has been removed and replaced manually.

When all parts are present and not defective, the mold is swung to a position above an injection nozzle. If the mold is not seated properly on the nozzle, the cycle halts. When the mold is seated properly, an air-operated plunger injects metal into the mold cavity, then retracts. Metal for this hot-chamber diecasting operation is melted in a Meehanite pot wrapped with a 2000-watt heating element.

After the metal injection, one of the mold halves rotates slightly to shear the sprue, and both halves withdraw from the nozzle. On their return to the initial position, the mold halves open, and a set of mechanical pickup fingers grasps the completed assembly, withdraws it, and places it on a discharge chute. Quality of the diecasting is such that flash need not be trimmed from the assemblies.

The equipment is fail-safe so that the cycle stops if any malfunction occurs. When the cycle does stop, a signal lamp lights to inform the setup man that the machine requires attention.

From a product quality standpoint, concentricity problems have been eliminated, and wobble is virtually cured. In the few instances where wobble still is experienced, it appears to be in the gears prior to assembly, and the restraining action of the mold halves is not sufficient to correct it.

Guide Bearing Manufacture—Production of two other watthour meter components, top and lower guide bearings, also has been upgraded. Each guide bearing consists of a 0.019-in. diam pivot pin diecast in place in the center of an outer shell. A bend in the pivot pin anchors this member in the diecast metal, which is the same lead-base alloy.

Although the old method of assembly was by diecasting, the machine was hand loaded and operated, and the small size of the pin made picking it up and loading it—in a mold opening with clearance of only 0.0005 in.—extremely difficult. Now, a six-station rotary indexing machine is used to assemble guide bearings automatically. As in the gear and wormshaft assembly, automatic checks at various points in the operation stop the machine and flash a warning light if an improper condition is present. Casting and sprue cutting are accomplished in the same fashions as with the gear and wormshaft assembly. The new method provides greater output, improves density of diecast metal, and reduces rejections.

Condensed from an article which appeared in the September, 1958, issue of *Automation*, a Penton Publication.

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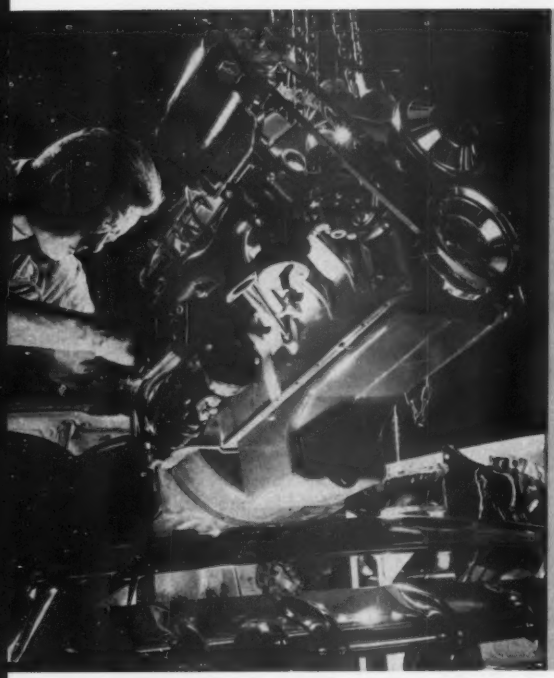


An Automobile Manufacturer Looks at . . .

ALUMINUM CASTING USE

This paper on automotive uses of aluminum castings was presented at the recent annual meeting of the Gray Iron Founders' Society

By DARL F. CARIS and DR. ROBERT F. THOMSON
General Motors Corp., Detroit

THE USE of aluminum for engine construction is not new. Aluminum engines have been proposed in the past and actually have been used in passenger cars in a few instances in this country. They currently are used in a number of passenger car applications in Europe. Aluminum has been used almost exclusively in aircraft engines where minimum weight is of the greatest importance and cost is not a consideration.

Why Aluminum Engines?—Why then, do we find all the interest now in aluminum engines for passenger cars? For simplicity, we have grouped the reasons together under the heading of improved efficiency. This grouping may be an oversimplification, but it will clarify the reasons for our interest in the use of light metals at this time.

Much of General Motors' engineering effort has been directed in a broad sense toward improved efficiency. This goal has been one of our major objectives in designing engines practically since the internal combustion engine was invented.

Let's see what this development has done for us: In 1947, post war compression ratios averaged about 6.5:1. Today they are up to 10:1. If the economics of producing higher octane fuels are sound, we probably will have even higher compression ratios in the future and even more efficient engines. If we had to drive today's miles of transportation with 1930-vintage engines, they would take 30 per cent more fuel!

Decreasing Economy—All this may seem somewhat off the subject, but actually it is not. Even though engine efficiency has increased over the years and is continuing to increase, we now are at a point where the trend in over-all economy in miles per gallon is down. Currently, we are faced with somewhat of a paradox. We have the most efficient engines in our history, but, unfortunately, the over-all economy trend is down.

There are several reasons for this situation. Our customers have developed a liking for more pleasing but not always most efficient automatic transmissions, for greatly increased performance in terms of ability to accelerate rapidly, and for an ever increasing number of power-operated accessories. But the most insidious factor is the year-by-year increase in vehicle weight.

Fig. 1 shows the trends in average passenger car weight and fuel economy from 1946 to 1958. Curb weight increased from approximately 3800 lb in 1946 to 4400 lb in 1958. Highway fuel economy improved until 1954, when the trend reversed. This trend is of great concern to our industry and provides the real incentive for the use of light metals.

Until about 1954, we were able to keep up with this increasing performance and weight and still show an increase in miles per gallon. Since that time, however, it has been a losing battle to try to offset these factors by improving engine efficiency.

One important way to improve economy is to reduce the weight of the automobile, and a good way to start is to reduce the weight of the engine. An aluminum engine can weigh up to 200 lb less than its cast iron counterpart. But this saving is

only the beginning: The lighter engine requires less structure to support it, lighter tires, lighter brakes, and better weight distribution. It is like starting a snowball down hill.

Today, the use of light metals not only is technically possible, but it is economically feasible and, one might add, extremely timely. One important new development which has made aluminum engines look attractive for passenger cars is the development and application of high-wear-resistant alloys which eliminate the need for cylinder liners.

To summarize why we are interested in aluminum engines, we're interested for two reasons: 1. Weight reduction and resulting improvement in efficiency. 2. Under present circumstances, aluminum engines are likely to be cheaper than cast iron.

From a materials engineering and production standpoint, the final adoption of any one material over another is governed by the successful solution of a number of problems. When one considers the possible substitution of aluminum for gray iron in automotive blocks and cylinder heads, at least the following require especially sound solutions. 1. Metallurgical problems. 2. Production problems. 3. Cost problems. Let us examine these.

Metallurgical Problems—The first problem requiring solution is to develop materials which will do the job. This development involves selection of materials which have satisfactory wear characteristics, corrosion characteristics, and mechanical properties.

Anti-Wear Characteristics—During development of the experimental aluminum engine, many materials were investigated in the laboratory and in the engines. These have shown degrees of promise varying from very good to unsatisfactory. Among the more promising were coatings and wear-resistant aluminum alloys. Coatings included chromium plate, iron plate, electroless nickelplate, oxide-type coatings, sprayed steel, sprayed molybdenum, and sprayed aluminum and its alloys.

A summary of some typical wear results obtained on a GMR bench wear test is shown in Fig. 2. Under these particular wear conditions, all of the materials shown are better than a heat-treated gray iron.

When one changes the geometry and the wear conditions, sometimes other problems are encountered. Fig. 3 shows some aluminum cylinder bores after dynamometer testing. The molybdenum spray showed good performance, whereas chromium-plated bores occasionally showed excessive wear at the top of the ring travel as shown in (b). This same condition also has occurred on chromium-plated cast iron bores. The wear-resistant aluminum alloys, including the high silicon materials, showed satisfactory wear characteristics when tested on a dynamometer and field tested.

In summary, after more than 100,000 miles of service by aluminum engines in actual cars, there appear to be several possible solutions to wear and score problems under normal driving conditions. In the event none of these finally meets all requirements, one always can rely on the use of cast iron liners although this solution is not ideal and will not achieve the goal of maximum weight reduction and minimum cost. We do not believe that reliance on cast iron as a bore material finally will be necessary.

Corrosion Characteristics — Aluminum cylinder heads and cylinder blocks using cast iron liners have run successfully in the past, and we see no difficulty in resolving this problem in aluminum engines of the future.

Mechanical Properties—The mechanical properties of one wear-resistant, 19 per cent silicon-aluminum alloy is compared with automotive cylinder iron and 355 aluminum in Table I. Although the properties are not identical with those of cast iron, they are

TABLE I—Comparative Mechanical Properties

Alloy	Tensile Strength psi, As-Cast	Tensile Strength psi, T-7	Fatigue Strength, Notch	E, Mod. $\times 10^{-6}$, psi
355	20-25,000	35,000	7-8,000	10.3
19% Silicon	20-26,000	31,000	7-8,000	13.5
Cast iron	30-35,000	.....	12,000	13-16

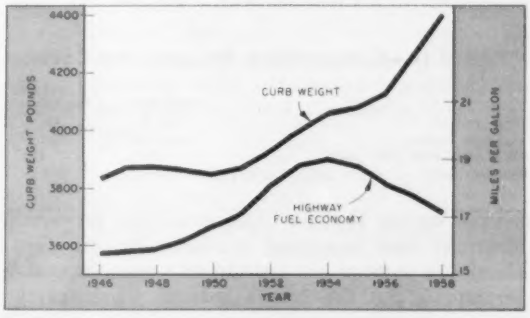
good enough for aluminum blocks. Even where the properties are lower than desired, changes in design often can compensate for the slightly lower properties. Suffice it to say that aluminum blocks and heads have been designed and run satisfactorily under a number of test conditions. It appears that there is no unresolvable problem here.

Production Problems—Since progress in the solution of all metallurgical problems has been significant and there is no reason to believe they will not all be successfully resolved, we now examine production problems. There are two areas of concern—the foundry and the machine shop.

Foundry Problems—There is a growing tendency to locate substantial foundry facilities in close proximity to aluminum reduction plants. For example, the Jones Mill, Ark., operation of Fabricast Div., General Motors, is in the immediate vicinity of a reduction plant of Reynolds Metals Co. Next year, Chevrolet Div. will have a similar operation at Massena, N. Y. Molten aluminum or aluminum alloy is taken directly from the reduction cell and transported in insulated containers directly to the foundry holding furnaces, thus eliminating remelting costs.

Some latitude is available in the molding methods

Fig. 1—Showing relationship between car weight and fuel economy for the period of 1946 to 1958



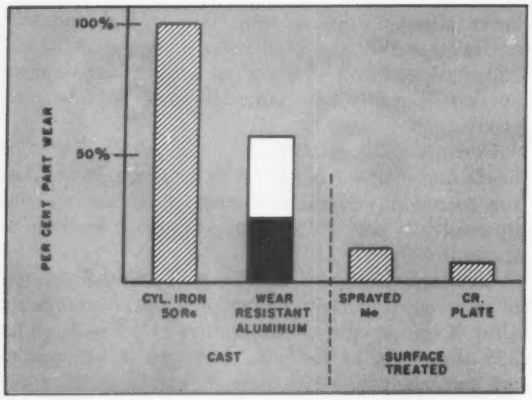


Fig. 2—Relative wear of various materials. The bar for aluminum covers several alloys. Those with greater resistance are shown by dark area

to be used. Some designs have been directed toward potential use of diecasting. You probably are familiar with the six-cylinder, diecast aluminum block made by Doehler Div., National Lead Co., as shown in Fig. 4. It appears that V-8 engines can be produced similarly. This six-cylinder engine required a liner, as will most diecast designs.

An alternative method is by permanent molding—and a foreign V-8 block has been made on full permanent mold equipment with an inserted liner. One can use semipermanent mold methods and produce an integral bore block.

Both types of blocks have been cast successfully in green and dry sand molds. Ultimate economics will determine the final molding method, but at the present time sand molding appears most uneconomical. The high-silicon alloys are more difficult to cast than alloys such as 355.

Machining Problems—Obviously, since a considerable number of engines has been built, there are no impossible machining problems. There has been considerable loose talk to the effect that machining rates may be much higher than those presently used for cast iron. This talk may or may not be accurate, depending on which alloys subsequently are specified. The very high-silicon alloys, for example, have about 50 per cent greater tool wear than conventional aluminum alloys, whereas conventional alloys probably can be machined faster than gray iron.

Cost Problems—A number of different cost surveys has been made, and the results indicate that aluminum is competitive with cast iron. A comparison for the Doehler block mentioned previously illustrates two important economic factors. First, aluminum castings are considerably more expensive per pound, but the greatly reduced weight of the aluminum engine offsets this disadvantage (see Table II).

TABLE II—Comparative Weights and Costs

	Cast Iron	Aluminum Die Casting
Cast weight	235 lb	49 lb
Finished weight	195 lb	43 lb
Estimated cost per pound	10c	45c
Finished cost	$19.50	$19.30

It should be noted there actually is a lower weight ratio than would be predicted by the densities of aluminum and cast iron. In addition, better dimensional control in the diecasting operation means that many bolt holes need only to be tapped in aluminum, whereas iron requires drilling and tapping.

If one must now use a liner, as with this particular block, the liners increase the cost of the block and place the aluminum engine at some cost disadvantage. This cost emphasizes the need for the satisfactory development of aluminum alloys or of cheap, durable coatings which eliminate the liner.

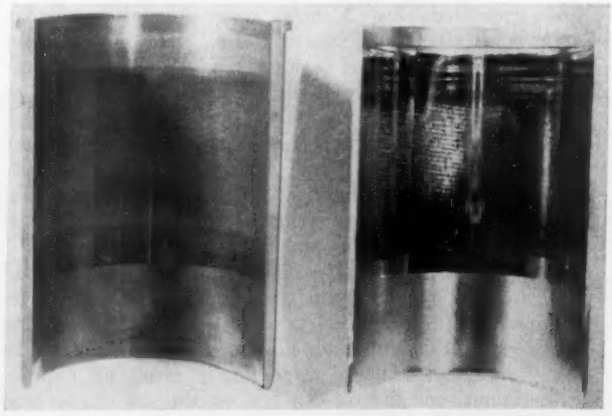
In summary, we are optimistic about the future of these new power plants. We believe that we are aware of the major problems still to be resolved and are continuing to do research to develop the power plants.

One should not conclude that all of the problems have been satisfactorily solved. It takes many years, millions of passenger car miles, and large production experience to point up all problems and to find satisfactory solutions to them. Some of these problems are technical, others economic, and still others involve customer reactions to the end product.

Impact on Gray Iron Business—We now turn our attention to the impact this and similar developments, if successful, would have on the gray iron industry.

In the automotive industry the average amount of aluminum per car has grown from about 2 lb in prewar cars to 6-8 lb in 1948, to 35 in 1955, to 52 in 1958, and to an estimated 57[1] in 1959. The gray iron casting industry has not felt this growth too greatly up to the present time because of the over-all increase in car weight. E. N. Cole[2], vice president of General Motors, recently stated, "Since 1942, . . . cast iron and malleable iron used in a typical Chevrolet have actually increased 6 per cent, up from 507 lb to 538 lb." Despite increases such as these, there has been no net gain for the gray iron industry. So the ferrous foundry

Fig. 3—Aluminum bores after dynamometer test: Molybdenum sprayed, left; chrome plated, right



industry must not be complacent because of maintenance of its market. From a different viewpoint, if the 57 lb of aluminum were replaced by an equal amount of ferrous product, it would be equivalent to between 150 and 200 lb of ferrous product.

Of immense concern is the future thinking that car weights will be decreased. This will have two effects. The actual number of pounds of ferrous product will be reduced as car weight goes down, but, more importantly, there will be increased emphasis on reducing car weight without corresponding decrease in roominess and performance. So more and more, engineers will be trying to replace ferrous materials with light metals.

Now what possible inroads are there apt to be in the future? Following is a list of parts which appear feasible for production in aluminum, together with the number of pounds of aluminum required per car: Pistons 11, transmission parts 22, cylinder blocks 50, cylinder heads 40, brake drums 18, clutch housings 7, intake manifolds 9. This total of 157 lb of aluminum castings conceivably can replace more than 600 lb of cast iron. In a 5½-million-car year this weight is equivalent to 1,650,000 tons of gray iron foundry products, or 13 per cent of the total 1957 gray iron tonnage.

If the gray iron industry accepts all of the arguments presented here, it should be interested in what it can do to maintain its markets. This is an exceedingly difficult question. In part this is true because gray iron is such a good and such a cheap material. It's hard to improve it and still decrease its cost.

The actual and potential loss we are discussing is due to a combination of the following: 1. Loss due to high density of cast iron (which we can't do much about). 2. Loss due to cheaper processing method (permanent mold or diecasting not generally applicable to cast iron). 3. Loss because of new economic and engineering factors (lighter weight and increased fuel economy).

How To Proceed—We should now examine what the gray iron foundry industry can and must do if it is to remain a growth force in this century. It must: 1. Improve its product to meet the challenge of competitive materials, or 2. It must be flexible in its outlook so that if the improvement is insufficient to meet the challenge, it is willing to produce the competitive material on an economic basis. 3. It must develop new products to replace that business it must inevitably lose.

At General Motors, we have tremendous faith in our ability to do the things we have discussed. We are continuously looking for totally new applications for foundry products. Cast turbine buckets are being used successfully in high-output jet engines; wherever wrought material produces a big pile of chips there is a potential new market for cast products.

We feel certain that we can produce properties in cast materials which cannot be met in wrought products. For example, final properties of many wrought products are compromised because extensive machining is required. Precision cast products need not be subject to this limitation. Some work now nearing completion at General Motors will soon result in the capture of a significant dollar volume of business for the foundry at the expense of wrought ferrous producing capacity because the latter industry has not produced, in this case, significant product development.

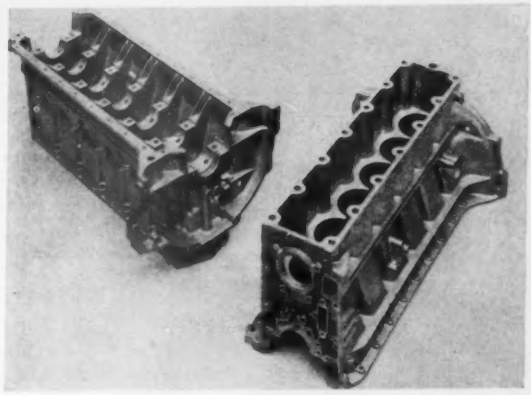


Fig. 4—Six-cylinder, diecast aluminum block by Doehler Div., National Lead Co., needs liners

Looking Ahead—While trying to think of some suggestions to the gray iron industry, the following are thrown out as thought provokers without really worrying about how practical they are or how much they have been investigated in the past:

1. Can you take hot metal directly from the blast furnace and avoid the remelting cupola operation?
2. Can you pour metal from an electric furnace into molds without entrapping slag as usually done in a lip pouring ladle?
3. With research in new high-temperature materials can you increase the scope of permanent molding?
4. What innovations can be introduced to produce thinner-walled castings?
5. What can be done to improve some special property of cast iron such as wear resistance, damping capacity, or modulus of elasticity?
6. Are you sure you can't successfully diecast irons?

While some of these ideas have been tried in the past and have been found impossible, they must be re-examined continuously in the light of changing economic and technological conditions. Dr. L. R. Hafstad, vice president in charge of research at General Motors, has argued that for any industry which does not engage in research and development of new markets, there can only be one termination point—bankruptcy via obsolesence due to a changing technological world and the inroads which competitive industries, who are developing new markets, will make.

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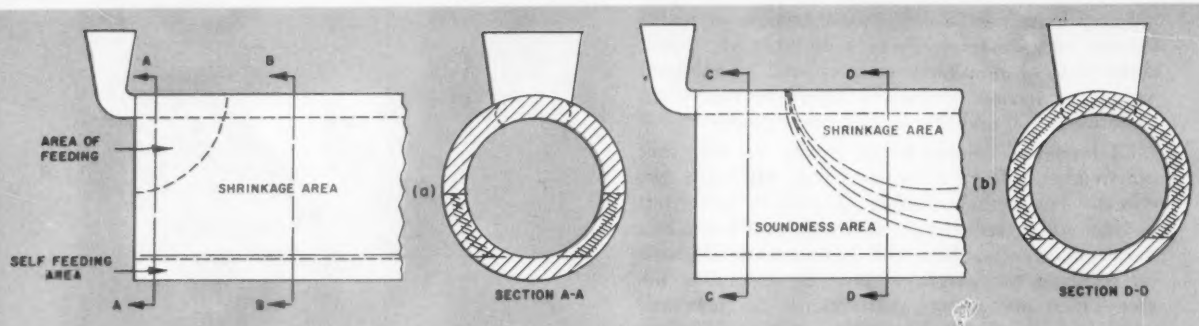

Fig. 23—Theoretical location of shrinkage in a riser-fed, horizontally cast cylinder is shown in (a) at left. Actual shrinkage is shown in (b)

Shrinkage Prevention in Bronze Castings

Casting design changes, location of risers, and the use of padding and chills are discussed in relation to preventing, reducing, or minimizing effect of shrinkage in bronze castings. This is the last of three articles

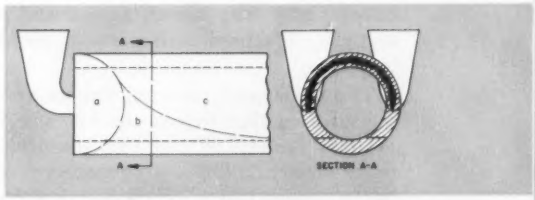

Fig. 24—Shrinkage in horizontal cylinder fed by parting-line risers is in area c. Areas a and b contain sound metal

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Foundry Engineer
Alexandria, Va.

CASTING a completely sound cylinder in the vertical position is fairly simple, but it is otherwise when casting in the horizontal position. Since the majority of the cylindrical parts of castings are in the horizontal plane, methods of pouring them must be studied. The main difficulty encountered is the necessity for feeding in two directions—lengthwise and circumferentially.

Fig. 23 (a) indicates the theoretical result which would be expected with rapid pouring which fills the mold and riser completely before any appreciable solidification begins. As usual, an area in the lower portion would be solid without the use of a riser. The area fed by the single riser would extend downward around the cylinder wall and horizontally only as far as indicated by the curved dash line. The section *A-A* would show solid metal at the bottom, due to the self-feeding tendency, and in the top area because of the riser. Between these two areas each wall would contain shrinkage. In section *B-B*, a distance greater than four times the wall thickness from the risered end, the only sound portion would be at the bottom of the casting, with shrinkage extending completely around the upper portion.

Fortunately, the sound metal would not be limited to these areas because it is impossible to fill a mold instantaneously. The slower pouring will carry the self feeding phenomenon to a higher point and increase the tendency of the riser to feed. Soundness area then would extend to points lying along the dashed contour lines indicated in sketch

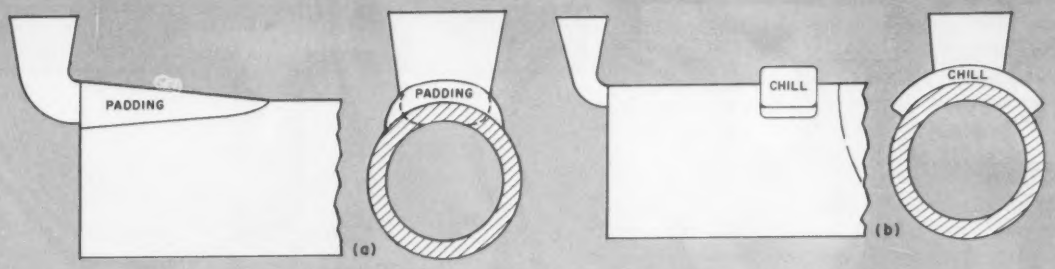


Fig. 25—To obtain soundness in a horizontally-cast cylinder, a top riser plus padding can be used as in (a) or top riser plus chill plate as in (b)

(b); the top lines would be reached if pouring is sufficiently slow. Using this reasoning, which appears to be correct from the author's experience, we should expect complete soundness to a distance of four times the section thickness. Section *C-C* should be completely sound. Beyond this distance, as at section *D-D*, we would expect sound metal at the bottom with shrinkage extending around the top as indicated by the shading in this view.

Dimensions Are Factor—No special difficulty should be encountered in pouring a horizontal cylinder not longer than eight times the wall thickness, and comparatively small in diameter. If the diameter becomes great in comparison with the wall thickness, vertical feeding of these walls may become impossible. Of course, the feeding of the casting of 8 T length necessarily would be accomplished by using a riser at each end, with metal gated directly into both.

Fig. 24 indicates the solidification of the same casting, using two parting line risers instead of the single top riser. The area (a) indicates approximately the theoretical feeding range of each riser—that is, four times the wall thickness, both laterally and circumferentially from the riser junction. The area of soundness will extend into area (b) because of the riser plus the inherent self feeding at the bottom of the casting. Area (c) will not be fed by either of the risers, and shrinkage is expected in most of the upper part of the casting as indicated by the shaded areas in the sectional view.

It will be noted that the amount of sound metal indicated is less than that shown in Fig. 23 although the two parting line risers contain six to eight times the amount of metal required by the single top riser. Hence, top risers, where practicable, are more efficient than parting line risers. Bottom risering should not be considered if it possibly can be avoided. As can be seen, the chief difficulty in casting horizontal, uniform-walled cylinders is getting the upper portion of the casting free from shrinkage.

The lateral feeding range of the top riser (Fig. 23) can be increased materially by the use of padding as indicated in Fig. 25 (a). The extent of increased feeding is limited only by three conditions:

1. It may not be practicable or permissible to add padding which must later be removed, thus detracting from the appearance, if the part is desired with the original cast surface.

2. As the length of the taper is increased, its width and thickness necessarily will increase, perhaps to such an extent that the size of the riser will be completely out of proportion to the dimensions of the casting.

3. As the taper increases in thickness, a point may be reached where equiaxed grains are formed. Equiaxed grains are especially conducive to incomplete feeding. The result would be that at some point the size of the taper (padding) would defeat the purpose for which it was added. The padding in the illustration, at the point where it joins the riser, has a thickness about equal to that of the casting wall. When this padding is removed, any midwall shrinkage resulting from equiaxed grains will be completely exposed.

On the credit side, the padding is equivalent to a riser extending along the casting for a distance equal to eight to ten times the wall thickness, thus extending the feeding this distance. In the present instance, the casting would be fed completely for this distance plus an additional distance of four times the wall thickness. If the whole wall could be designed with a suitable taper, no padding would be required.

Use of Chills—Since padding may be objectionable, other means should be considered for accomplishing the same purpose. By the use of a chill placed circumferentially around the top of the casting as shown in Fig. 25 (b), the feeding range of the riser can be doubled. This would have the effect of carrying the contour lines shown in Fig. 23 (b) somewhat beyond the further edge of the chill, approximately as indicated by the dash line in the present case.

The use of the chill will achieve soundness by the use of a smaller riser than is possible by padding alone and should eliminate all of the disadvantages listed for padding. In certain cases however, it will be less effective than padding or tapering, and the feeding range will be somewhat more restricted. In the present case the edge of the chill positioned nearest the riser should be placed at a distance from the end of the casting equal to ap-

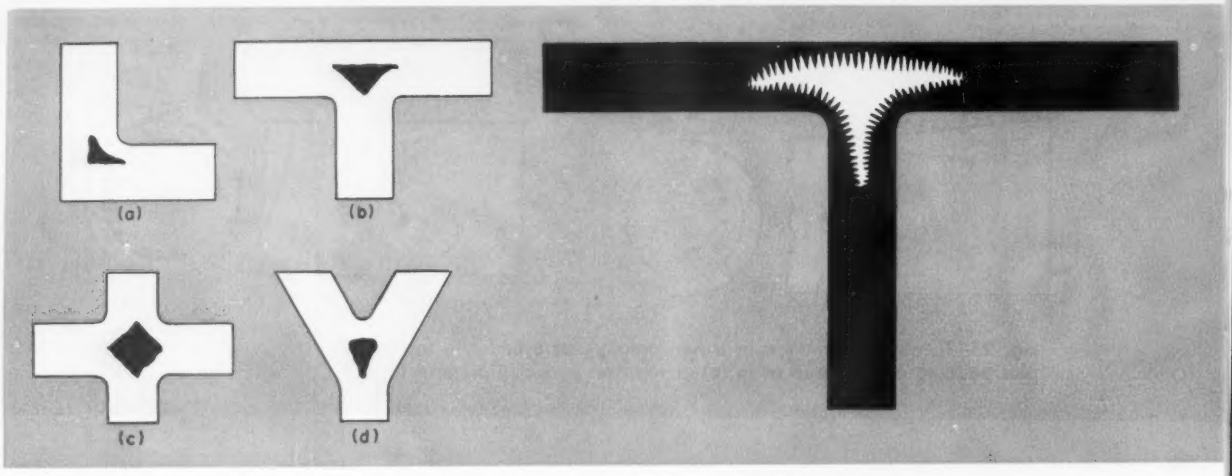


Fig. 26—Shrinkage at typical intersections in steel castings fed through casting arms only

Fig. 27—Shrinkage cavity obtained in bronze T-section when fed only through casting arms

proximately eight times the wall thickness. The chill should not be too wide or the metal will freeze up too quickly under it and cause cold shuts and wrinkles. The chill would tend to prevent feeding beyond it.

The ideal use of chilling is in conjunction with two top risers, one at each end. By placing a suitable chill at the midpoint of the casting and feeding up to it from both ends, it should be possible to produce a sound cylinder the length of which is twenty times the wall thickness without the use of tapering or padding. It should even be possible to increase this 20 T length by a suitable combination of padding and a midlength chill.

Few Simple Sections—Few castings consist of simple sections alone, but many are formed almost entirely of combinations of simple designs. Typical examples are the combination of plates to form box-shaped castings, cylinders and flat rings to form flanged fittings, compartments within a casting, and ribs added for strength. Each junction or intersection of those sections is likely to introduce its own effect on the over-all problem of feeding to complete soundness.

Before proceeding with the discussion of junctions and intersections, attention is directed to work by Briggs, Gezelius and Donaldson[7] which was apparently the first exhaustive discussion on this subject. Although limited to steel castings, the internal defects would be as large as those shown and probably considerably magnified with bronze cast in the same way. For instance, the shrinkage area in the T section, Fig. 26 (b), in steel or in brass would exhibit in bronze considerably rougher walls in the shrinkage cavity and would tend to extend into the arms as shown in Fig. 27.

In the work reported, feeding was through the different arms of each particular design under study. The study also considered changes in design, use of chills, or both, which would decrease or eliminate the shrinkage occurring in the large area created by intersections. Fig. 28 shows the best procedures for the sections which are shown in Fig. 26.

Fig. 26 (a) indicates the amount of shrinkage and the shape of the shrinkage cavity to be expected with a normally freezing metal fed through the two arms. This design is fairly common in castings such as square-cornered boxes, closed end cylinders, flanged fittings, etc. Designers generally require a sharp outside corner with an inside fillet, and in certain cases such a design is necessary. Since it contains an enlarged area to be fed through smaller side sections, however, it is subject to shrinkage defects.

Fig. 28 (a) shows one method of eliminating shrinkage in an L intersection by substituting a curved section for the sharp corner. Additionally, the junction is made slightly thinner than the arm sections by locating the center of the arc of curvature a slight distance inward from that of the inside fillet. With this design, if metal is poured and fed from the end of each arm, solidification will be initiated in this thinner section, progress toward the feed heads, and a completely sound intersection should result.

In many cases, however, it will be impossible to pour the L-shaped casting through both arms, and other arrangements must be made to obtain soundness. Usually, the only possible way is by suitable design changes. If the intersection somewhat as shown in Fig. 28 (a) is permitted, the L-shaped section then becomes a curved plate and rules given for plates in various positions are largely applicable.

A change, (Fig. 30) is required to eliminate the shrinkage resulting from incomplete feeding of the middle portion of the casting. It consists in tapering slightly the area between *A* and *B* which showed shrinkage in Fig. 29. The original casting section is represented by broken lines.

Chill at Inside Fillet—In cases where the curve is not permitted on the outside corner, soundness in the enlarged area can be obtained by using a chill at the inside fillet as indicated in Fig. 31, *provided that metal flow and feeding is provided*

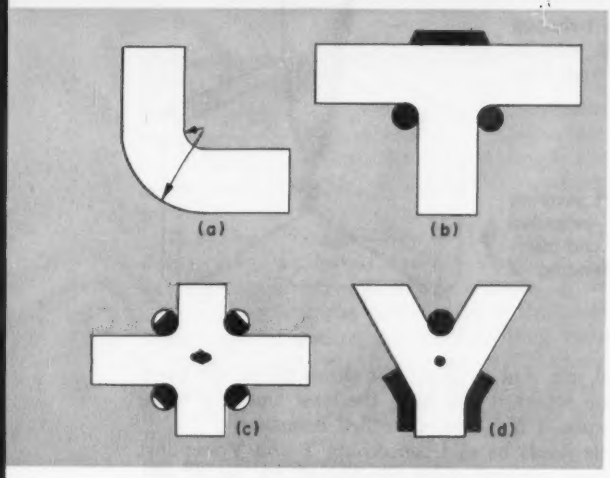


Fig. 28—Change in casting design and use of chills as shown reduce or eliminate shrinkage

through both arms of the L-section. Probably the most economical chill to be used in this case would be round bar stock having a radius equal to that of the fillet. With such an L-section there is little or no sensitivity with regard to the size of the chill which may be used, provided it is large enough to remove the necessary heat, and as long as feeding is provided from both arms up to the intersection. Briggs, Gezelius and Donaldson found that a single chill, shaped like those in Fig. 28 (c), is of sufficient size to produce complete soundness in steel.

Chills, although very effective in controlling shrinkage, must be selected with considerable care in most cases. They must be large enough to abstract the required amount of heat, yet they must not be so large as to over-chill the area to an extent that the shrinkage will be increased. Placement of chills must be done carefully so that no feeding beyond them will be necessary. In simplest terms, the metal should flow up to and against a chill, but should not flow over it to any great extent.

Fig. 32 illustrates an additional method to obtain complete feeding of the intersection. Sometimes it is satisfactory where extended surfaces must be fed, since feeding is outward from the enlarged intersection. It is especially applicable to vertical corners. This method takes advantage of the hot spot resulting from the enlarged area to feed both uniform sections emanating from it. The lower part of the casting would be self feeding up to a distance equal to two times the diameter of the largest circle which can be inscribed in the enlarged section. The hot spot area above will require a riser which will feed a distance equal to four times the diameter of the inscribed circle. Below this 4 T point and above the 2 T point, sufficient taper must be provided to furnish the necessary directional solidification.

If the hot spot is fed completely, the sections extending out from it automatically will be fed for a distance of four times their thickness. This distance will be increased to eight times if the ends

Fig. 29—Zones of soundness and shrinkage in this top-fed, L-shaped casting are portrayed

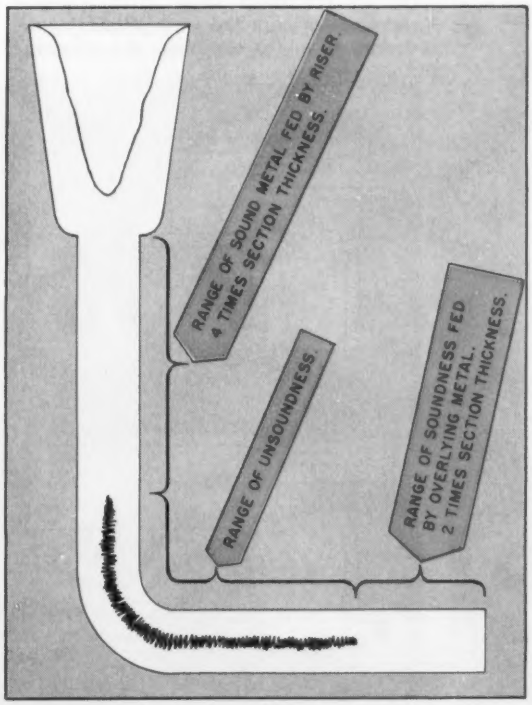
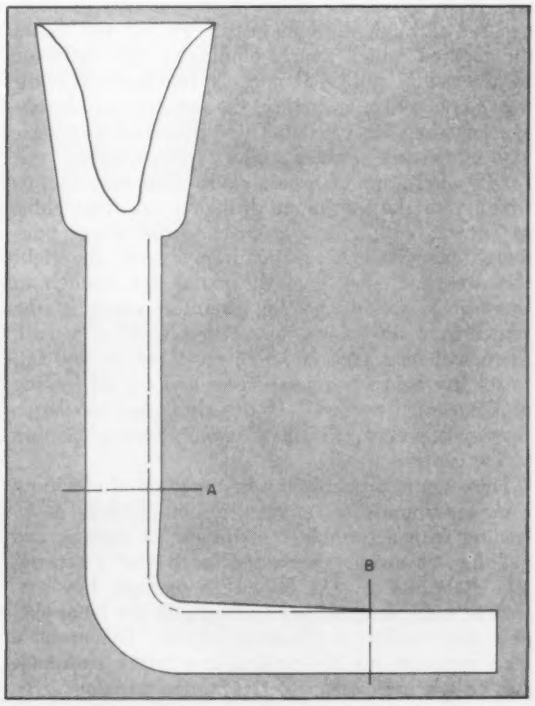

RANGE OF SOUND METAL FED BY RISER. 4 TIMES SECTION THICKNESS.
RANGE OF UNSOUNDNESS.
RANGE OF SOUNDNESS FED BY OVERLYING METAL. 2 TIMES SECTION THICKNESS.

Fig. 30—The L-shaped casting can be padded as shown to obtain soundness in the section A-B



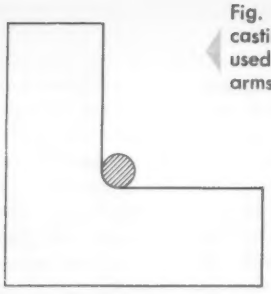


Fig. 31—If the outside corner of an L-shaped casting must not be rounded, a chill may be used as shown and the casting fed from both arms to provide casting soundness

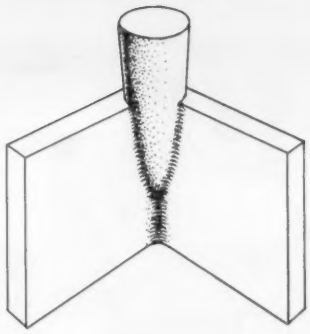


Fig. 32—Another method of securing soundness in L-sections of extended surfaces employs padding and risering in a way to procure feeding of the area at the intersection

of the sections are chilled. Furthermore, by a suitable combination of chilling, tapering of the side sections, and risering of the intersection, side plates of considerable extent can be produced with complete freedom from shrinkage.

Feeding T-Sections—Fig. 26 (b) shows the extent of the shrinkage cavity obtained in steel when feeding a T-section through the three arms. Some reduction in size and changes in shape and location of the shrinkage cavity can be effected by suitable changes in the comparative thicknesses of the arms.

As indicated in Fig. 28 (b), it is possible to eliminate shrinkage by the use of fillet chills, and a flat chill used alone will eliminate the shrinkage opposite the side arm. Neither fillet chills nor the flat chill used alone will eliminate the shrinkage entirely, but should reduce its extent considerably. The fillet chills used alone will drive the shrinkage toward the outer surface of the continuous section. The flat chill used alone will drive it toward the arm. If the T-section can be cast vertically, shrinkage can be prevented entirely by the use of suitable risering and padding, much as indicated for the L-section in Fig. 32.

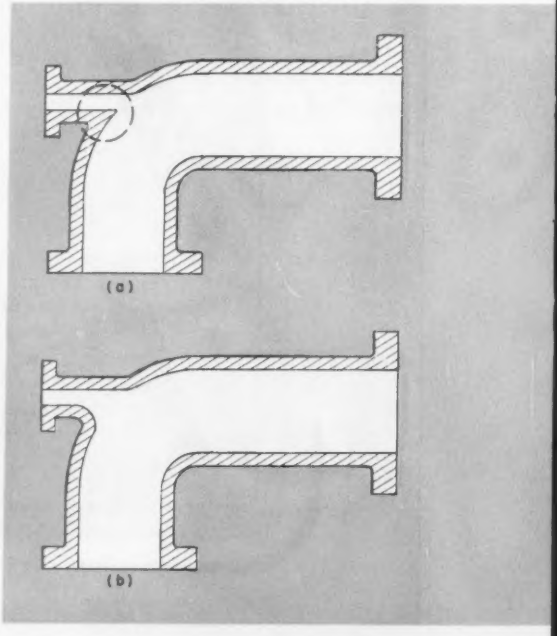
Feeding X-Sections—Fig. 26 (c) shows the shrinkage cavity produced in an X-section cast in steel and fed through the four arms. Fig. 28 (c) shows the method which nearly eliminates the shrinkage by the use of chills. It must be realized that chilling alone will not reduce the amount of shrinkage less than indicated. This illustration is especially interesting since it indicates the extreme sensitivity of chilling in certain cases. The actual chills which give the minimum shrinkage are fillet chills as shown, with one side removed for about one-fourth the diameter. If chills of exactly the right size are used, they cool the metal just enough to cause it to solidify at the instant it meets in the center from the four arms. If less chilling is used, there will be a pool of liquid metal which will fail to solidify before the arms freeze and cut off feeding of the center portion. If the chills are too large, they will prevent the metal from flowing together at the center.

Here again, probably the best method of obtaining complete soundness in such an intersection is by feeding with a suitable combination of risering and padding, as already explained for L and T-sections and illustrated in Fig. 32. It is realized, however, that in some designs riser feeding will not be applicable and chilling is the only answer. The problem then becomes one of deciding how much shrinkage can be tolerated without harming the part for its intended use, and to place this shrinkage in the exact location where it will have the least tendency to be dangerous if it is not controlled completely.

Little needs be said concerning T and V-sections; the same general rules mentioned for other sections also apply here. Fig. 26 (d) and 28 (d) are shown for the reader's benefit. Some of these sections can be discussed best by showing some actual examples with which the author has come into contact. Fig. 33 (a) illustrates a typical example often encountered which invariably results in shrinkage. This is an elbow casting with a flanged outlet on the outside of the bend. As designed, the junction of the outlet with the body of the casting contains a V-section as indicated in the dotted circle. Although this particular intersection is impossible to feed through either the wall of the main part of the casting or that of the outlet, it is apparently common practice to design such outlets in this manner.

The simplest and most economical method of eliminating the shrinkage would be to redesign the

Fig. 33—The design shown in (a) results in shrinkage at encircled area. Modifying the design as in (b) eliminates the shrinkage



area as shown in Fig. 33 (b), to eliminate the heavy section and to provide a taper from the main body into the outlet. By eliminating the shrinkage this recommended design actually will be stronger than would be the case with the original design. Furthermore, fluid flow through the casting would be improved.

The Sharp Corner—Fig. 34 (a) shows another design error analogous to that shown in Fig. 33 (a) but which is much more common. In fittings with side outlets, the tendency is to design the interior walls in such a manner that they meet with a sharp angle at the inside corner (compare with L-intersections). As already has been considered, this corner is a real source of shrinkage which is likely to cause leakage and at best will weaken the part at that point.

To strengthen this area, the patternmaker often will build his corebox to provide additional metal, much as shown by the dotted lines. This added metal, increasing the area still further, merely aggravates the difficulty by causing more shrinkage with increasing tendency to leakage. The real answer to the problem is to design the corebox to provide a fillet on the inside and actually form a wall slightly thinner at the junction, as indicated in Fig. 34 (b). This will eliminate the shrinkage, provided all other conditions are advantageous for feeding. With the shrinkage eliminated, the junction will be stronger and no leakage will be encountered at this often troublesome point. By the correct use of chills, the shrinkage can be eliminated even though the sharp corner may be required. It should also be possible to devise ways of feeding this heavier area.

The author desires to end this series with the description of a rather peculiar incident which occurred in one foundry. This foundry, a subcontractor for bronze centrifugal pump bodies, was losing an exceptionally large number of castings, which caused a dangerous hold-up in deliveries to the contractor. The difficulty was the presence of shrinkage in the "cut water" portion of the pump body as illustrated in Fig. 35 (a). This is a V-section which usually is fed through the pump body and the outlet.

The shrinkage which normally occurs in this V-section causes leakage at the point indicated by the arrow. The author recommended casting a chill to fit around the fillet, as indicated in Fig. 35 (b). Although this chill could not eliminate the shrinkage entirely, it was known that it would drive it toward the point of the "V" as indicated. If leakage occurred, it would be through the area indicated by the arrows. The author had been assured by pump engineers that slight leakage at this point would have no deleterious effect upon the efficiency of the pump.

Unfortunately, the foundry in question decided that such cast chills would be too expensive and placed two chills which were in stock in the positions shown in Fig. 35 (c). As would be expected, these chills merely aggravated the leakage, driving the shrinkage farther out toward the fillet. Instead of the slight seepage previously experienced, the castings were actually "squirters."

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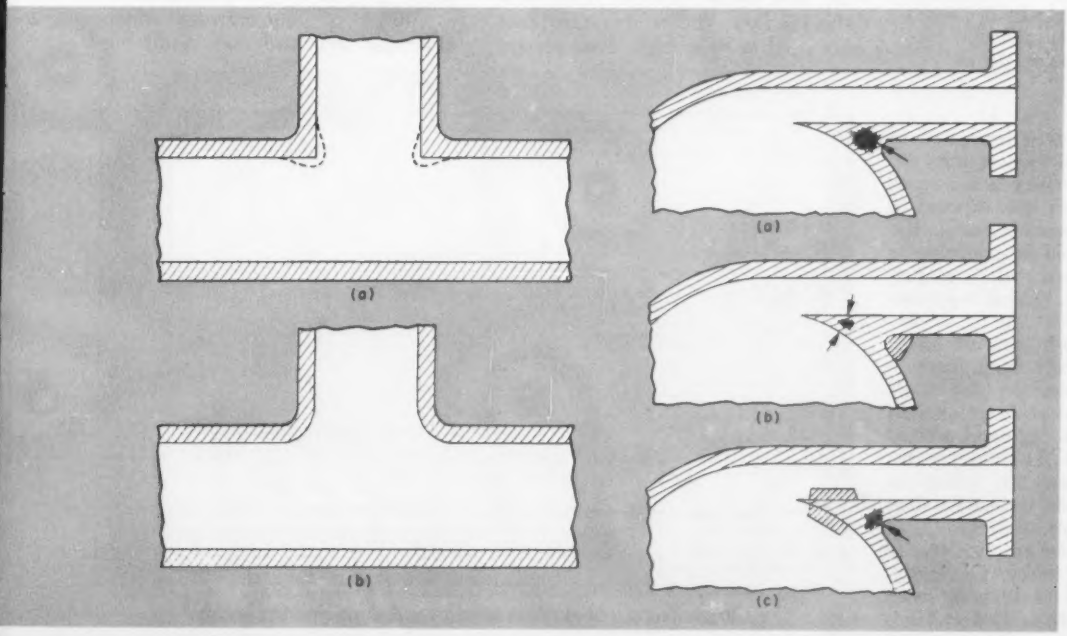
Fig. 34—Another example of getting rid of shrinkage by changing design. Shrinkage in dotted areas of (a) is eliminated in (b)

Fig. 35—The use of chills helps to control extent and location of shrinkage in castings. Leakage is indicated by the arrows



Questions and Answers

Hard ramming of large flat surface results in formation of scabs . . . Stress relief and annealing operations are performed at different temperatures . . . Cracking caused by extremely high pouring rate

Scabs Spoil Tablet Surface

We have been trying to make a tablet or grave marker 14 x 44 x ¼ in. of a red brass alloy containing 83 Cu- 4 Sn- 6 Pb- 7 Zn, but are having trouble with a scab which appears almost any place, but usually in one particular letter. We have tried Windsor Lock sand for facing as well as No. 00 Albany with 3 per cent cereal core binder. Moisture is 5 per cent, green strength 13 psi, permeability 70, and mold hardness as high as 80.

Also have tried synthetic sand with 3.3 per cent moisture, green strength 13 psi, permeability 70, and mold hardness of 90. Have been using a mold spray and also molasses water; skin drying the mold in both cases. Have been pouring two up on same side of the mold with a kiss gate ⅛-in. thick the length of the casting. Mold is elevated on the sprue side with two ⅜-in. vents on the lower side and cope properly vented with 3/16-in. wire. We have to use a pouring temperature from 2180 to 2260° F before the casting will run.

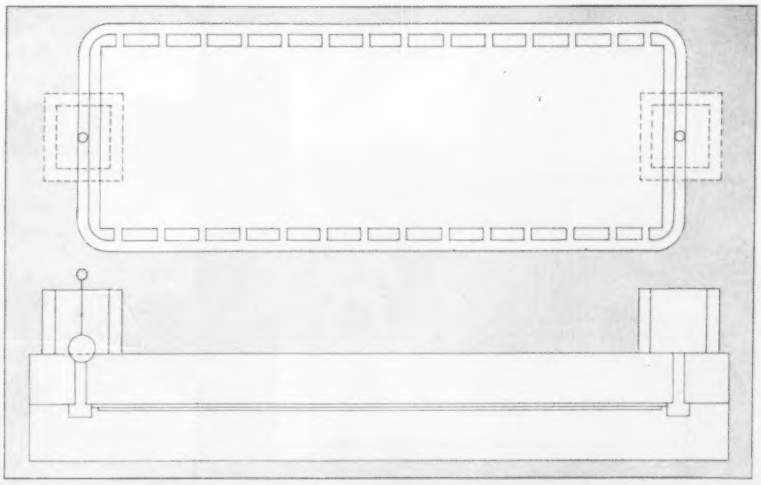
Your difficulty with formation of scabs on the mold face is that the sand is so dense there is no room for expansion when it is exposed to the heat of the molten metal. Result is that the mold face deforms or buckles, permitting the molten metal to penetrate behind a portion of the sand.

Your mold hardnesses of 80 to 90 appear extremely high for tablet work. Usual practice is to riddle sand on to the pattern from a height of 8 to 12 ft, peen the sand around the edges of the flask to prevent "ramming off" on the letters or characters, and then walk off and/or butt ram the center.

Three possibilities are available to overcome the difficulty. Obviously, reduction of mold hardness by softer ramming is one method. Another is the addition of some type of cushioning agent such as wood flour, cereal, perlite, etc. in sufficient quantity to permit expansion. Third possibility is reduction of metal temperature which in turn lowers the amount of expansion of the sand.

We believe that the tablet can be poured at a lower temperature than the range you mention by use of many small gates, as indicated in the accompanying sketch. Gates are ⅝ in. wide and ¼ in. deep, located in the drag, and attached to an encircling runner about 1 in. from the tablet. Runner is ¾ in. wide and ⅝ in. high extending up into the cope. Pouring basins, 4 in. wide, 5 in. long, and 5 in. high, are situated over the sprues at opposite ends of the casting. Plugs in the sprues permit filling the basins with molten metal. Plugs are withdrawn simultaneously, permitting only clean metal to flow into the cavity.

Feeding the casting from both sides results in a shorter distance for the metal to flow, and with shorter flow, the temperature does not need to be as high. Your present kiss gate might operate satisfactorily if it were attached to a runner of suitable size. Our impression is that it is only ⅛ in. thick, extending along the length of the casting and acting as both runner and inlet into the casting cavity.



Suggested use of multiple gating system and pouring basins

Heat Treatment of Gray Iron

Can you supply us with a copy of standard specifications for stress relieving or annealing gray iron castings? We are interested especially in the temperature range and time for annealing.

Heat treatments of gray iron castings for stress relief and for annealing are conducted for two different purposes, and should not be confused. Stress relieving is conducted at lower temperatures than annealing, and, as the name indicates, is only for relieving internal stresses created by differences in cooling rates of the various parts of the casting, by mold restraint, etc.

Stress relieving operations are performed at temperatures which result in slight, if any, reduction in physical properties. Annealing is conducted at temperatures which alter the structure and results in

softening and a decrease in physical properties. Annealing usually is performed to improve the machinability of the casting.

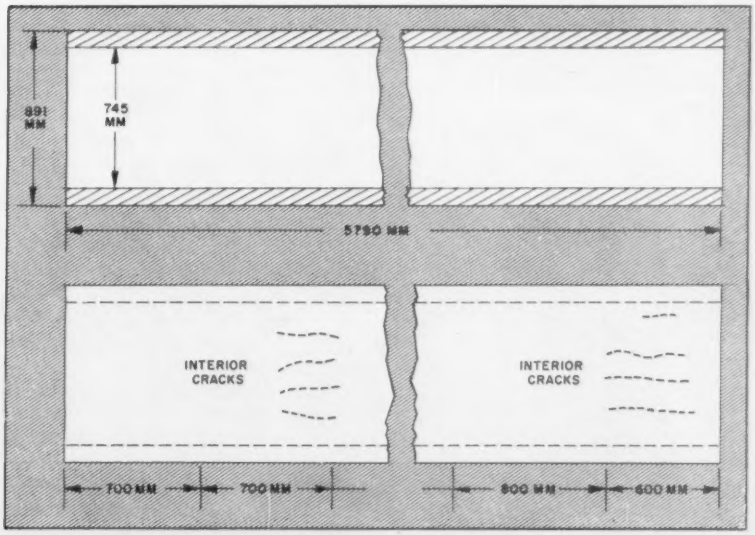
So far as we know, there are no standard specifications for either process. Stress-relief operations are carried on in three temperature ranges depending on the type of iron. The range for unalloyed gray iron is 950 to 1050° F; for low-alloy iron it is 1050 to 1100° F and for high-alloy gray iron 1100 to 1200° F. Usual holding time at temperature is 1 hour per inch of cross-sectional area of the heaviest section. Castings should be cooled slowly in the furnace to about 550° F except in the case of intricate castings, which should be cooled to 200° F before removal.

Annealing or softening usually is carried on in the range 1300 to 1400° F, but if chilled areas are present it may be necessary to run up to 1650° F or more. Time for holding at temperature and cooling rates are similar to those used in stress-relief operations. Again, as in the case of alloyed irons treated for stress relief, the temperature for annealing or softening will be higher than in the case of unalloyed irons. With either stress-relief or annealing heat treatments it is advisable to study different castings at various temperatures to determine the lowest temperature at which the desired results can be accomplished. These operations are an added expense, and it will pay to keep them within reasonable limits. We suggest you obtain a copy of *Gray Iron Castings Handbook* which devotes one chapter of over 100 pages to discussion of heat treatments.

Pouring Rate Is Too High

In our steel foundry in Japan we operate a centrifugal casting department, and have run into a problem in trying to produce a suction press roll from an alloy containing 0.11 to 0.14 per cent C, 0.68 to 0.98 per cent Si, 0.78 to 1.06 per cent Mn, and 13.28 to 14.43 per cent Cr. The roll as cast is 891 mm (35.1 in.) OD, 745 mm (29.3 in.) ID, and 5790 mm (227.75 in.) long and weighs 8600 kg (18,920 lb). Mold rotation provides a force of 60 G on pouring and 50 G after. Pouring rate is 75 to 80 seconds into both ends of the mold simultaneously.

Our problem is appearance of longitudinal cracks on the interior wall after machining, as indicated in the sketch. Cracks are almost parallel to the longitudinal axis and are 15 to 25 cm (0.59 to 0.98 in.) deep. We have cast five pieces so far, but have not been able to eliminate the cracks. We believe that the problem is one of centerline shrinkage and want to try application of exothermic material after pouring, but others do not agree with that premise.



Cracks in centrifugal casting bore caused by lack of feed

Your approach to producing this large cast steel suction roll by filling the mold from both ends is in contrast to the usual practice of pouring from one end. While your procedure permits rapid filling of the mold—75 to 80 seconds—we suspect that it is the cause of your difficulty with cracks on the interior surface. In other words, we are inclined to agree with your contention that the cracks are caused by lack of suitable feeding which results in a type of centerline shrinkage.

Because of rapid pouring, the mold is filled with molten metal at practically uniform temperature, and freezing or solidification starts at both the mold-metal interface and the interior surface exposed to the atmosphere within the mold. While the rate of heat extraction by the mold is considerably greater than that of the mold atmosphere, it is not sufficient to counterbalance the solidification moving in from the exposed surface. Hence, an area between the two solidification fronts will not receive any feeding.

It is possible that application of some exothermic agent to the exposed surface of the metal in the mold would eliminate the difficulty. First, however, it would be well to try to achieve the desired results by decreasing the pouring rate to a point which will provide suitable progressive or directional solidification from mold wall to inner surface. Your present pouring rate is about 250 lb per second, but indications are that this can be lowered considerably. We suggest you try pouring at about one-third that rate. Observe the results obtained and then make suitable adjustments.

It may be that your difficulty could be solved by use of exothermic material placed on the interior surface, but it seems to us that this

would involve problems of proper time of the addition to obtain the desired liquefaction, means of providing uniform distribution of the agent on the metal surface, etc.

It also might be pointed out that after the mold is filled, the rate of mold rotation can gradually be reduced to just above the point where "raining" of the metal will take place.

Chill Depth Exceeds Limit

We are enclosing for your consideration a sketch of a small iron casting to be produced in a chill mold, also a section of one of the castings. The customer demands a chill depth from 1/32 in. minimum to ⅛ in. maximum. The chill mold has a wall thickness of 1½ in., and the only method of additional cooling is by water spray. Iron analysis at the cupola spout is 2.50 to 2.60 per cent Si, 0.09 to 0.117 per cent S, 0.15 to 0.20 per cent P, 0.55 to 0.63 per cent Mn, and 3.45 to 3.55 per cent TC. To that we add ¾ lb of 50 per cent fine chrome to a hand ladle containing 50 lb of iron. We feel that the maximum and minimum chill depth is too difficult to maintain or secure. Our chill is running much deeper.

Your statement that the chill depth obtained is much deeper than the maximum specified is confirmed by fracture of the section which shows the total chill to be 3/16 to ¼ in. We believe that you can come much closer to the specified limit by reducing the amount of chromium added. Try cutting the addition in half—6 oz per 50-lb ladle instead of the present ¾ lb. Observe the amount of chill obtained on fractured sections, and then make suitable adjustments in the chromium content until the chill remains somewhat below the maximum specified, preferably about in the middle of the range.

To obtain consistent results in the chill it will be necessary to exert close control over iron composition, pouring temperature, and mold temperature. Most suitable conditions will have to be determined by experiment, and once they are established it should not be difficult to hold the chill on the castings within the desired limits.

Blast Cleaning of Castings

We operate a small foundry in India making about 2½ to 3 tons of gray iron castings per day. Castings are for power looms which require about 200 castings weighing 1 to 10 lb and another 16 castings weighing 17 to 150 lb. The heavier pieces consist of loom ends weighing about 150 lb and 37 x 42 in. in size, and of long members about 7 ft x 6 to 18 in. and weighing 40 to 90 lb.

Smaller castings are fettled in tumbling barrels, and the larger parts by wire brushing. The latter is not very satisfactory, however, and the customers complain about the rough appearance. Do you think the large castings can be cleaned by abrasive blasting, and what type of equipment should be used?

We believe that abrasive blasting should provide a finish which will eliminate your customers' complaints. It seems to us that the choice of equipment will have to be based on recommendations of the manufacturers of abrasive blasting equipment since their experience will serve as the guide.

There are two ways the large castings could be handled. One would be to use a room of suitable size in which the castings could be suspended by various means or placed flat on supports or on a car. The other method would be to use a table-type blasting machine. We believe that the machine table would have to be at least 12 ft in diameter to handle the 7 ft x 18 in. pieces, and three pieces could be arranged in the form of a triangle. Such a table could handle considerably more of the 42 x 37 in. pieces, and also could be used to clean a large number of the smaller castings. With a table machine the pieces are blasted on one side, turned over and blasted on the other side. As mentioned earlier, the best procedure would be to seek advice of blast equipment manufacturers.

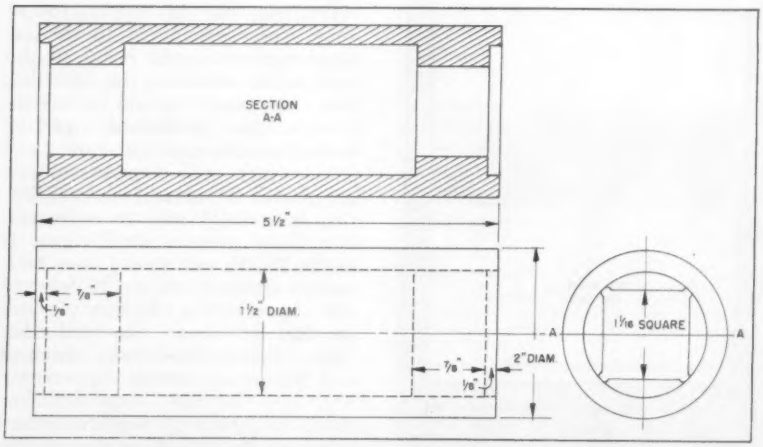
Cores Are Not Satisfactory

We are casting various sizes and types of red brass pump impellers which range from 10 to 30 lb in weight. We are not entirely satisfied with the cores used since we are encountering some veining and some burning-in. We can overcome these difficulties to a large extent by washing the cores. Some of the cores are very intricate, however, and it is extremely difficult to apply an even wash. We are wondering if you could suggest one or more core mixes which might be tried. Is it possible to make cores for work of this nature which do not require washing?

Without any knowledge of your present formulations of sand mixtures for the impeller cores, it is difficult to supply any definite information. It appears that your present practice is not too far away from the desired point. Possibly the addition of 1 to 2 per cent iron oxide or addition of silica flour to the mixtures might aid in overcoming your trouble.

It may be that the trouble arises from extended impingement of the molten metal on certain areas of the core. This problem might be eliminated by modifying the gating, or by facing the core in those areas with a more refractory material such as zircon sand.

You mention that the difficulty is overcome to a great extent by washing or coating the cores but that intricacy of the core causes trouble. You do not mention the method of application, but if you have not tried dipping, we suggest you do so.



Sketch showing details of casting made in chill mold

US RUBBER GRINDING WHEELS

Inset shows actual U. S. Lo-Temp Cup Wheel.

Grinding with a corn cob?

It's a fact! In the new U. S. Lo-Temp Cup Wheel, ground-up corn cobs are blended into the batch with some remarkable results:

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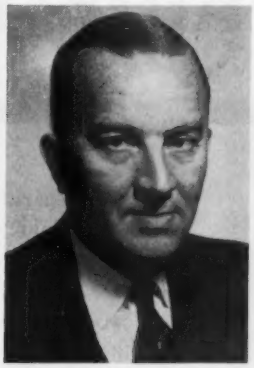
Men of Industry

● FRED J. WALLS
. . . Inco manager retires



● WALTER E. REMMERS
. . . Pittsburgh Met pres.

● LAWRENCE J. DeFAZIO

● RALPH MATHISON
Hamilton Foundry promotions

FRED J. WALLS, recently manager, Detroit office, Development and Research Div., International Nickel Co., New York, has retired. Mr. Walls received his technical education at University of Michigan, where he specialized in metallurgy. He was employed by Packard Motor Car Co., Detroit, and Wilson Foundry & Machine Co., Pontiac, Mich., and in 1932 was consultant to Eaton-Erb Foundry Co., Vassar, Mich., now the Foundry Div., Eaton Mfg. Co. He became manager there prior to joining International Nickel's Detroit office in 1934 as manager. Long active in the American Foundrymen's Society, Mr. Walls was its national president in 1945-46. In 1955 he presented the Charles Edgar Hoyt Memorial Lecture before the AFS Convention in Houston.

Joseph P. Richardson, formerly with the air filter products department in the home office, American Air Filter Co., Louisville, Ky., has been transferred to the Minneapolis office. **Stanley D. Jensen** has joined the Denver branch office as sales engineer.

Cecil L. Kerr has been appointed Pittsburgh district sales representative, Selas Corp. of America, Dresher, Pa. He will assist **John L. Wilson** in the company's new office at 345 Mt. Lebanon Blvd., Pittsburgh. Mr. Kerr previously was with Salem-Brosius Inc., Carnegie, Pa.

● **Walter E. Remmers,** former vice president, Union Carbide Corp., New York, has been elected president, Pittsburgh Metallurgical Co., Niagara Falls, N. Y. **Charles F. Colbert Jr.,** president since 1939, will continue as chairman of the board. Mr. Remmers formerly served as president and chairman of Electro Metallurgical Co., and United States Vanadium Co., divisions of Union Carbide, and became vice president of the parent company in 1952.

John S. Jackson has been elected president, Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. **Sydney Buckley,** with the company nearly 60 years, and president for 23 years, will continue as board chairman. **Herbert Gledhill** has been named vice president and general sales manager. Mr. Jackson joined the company in 1917 and became sales manager and a director in 1946. He had been vice president since 1951.

Richard D. Wright has been elected president, Waukesha Foundry Co., Waukesha, Wis. C. C. Smith, founder and former president of the company, died last year. Mr. Wright joined Waukesha Foundry 20 years ago and recently was engaged in sales operations.

C. Della Rocca has been appointed sales manager, Sierra Foundry Supply Co., San Gabriel, Calif.

● **Lawrence J. DeFazio,** recently production co-ordinator, Hamilton Foundry & Machine Co., Hamilton, Ohio, has been made supervisor of industrial engineering. **Ralph Mathison** has been promoted from foundry foreman to general foundry foreman. During 23 years with the company, Mr. DeFazio's duties have included casting inspection, sand testing, payroll, price setting, time study, core department, and production co-ordinator. Mr. Mathison joined Hamilton Foundry in 1952 and has worked through various phases of foundry production operations.

Charles S. Anderson, since 1935 president of Belle City Malleable Iron Co. and Racine Steel Castings Co., Racine, Wis., has also been elected board chairman. In the latter capacity he succeeds the late Judson F. Stone.

Thomas W. Teetor has resigned as general superintendent, Federal Malleable Co., Milwaukee, to enter the graduate school at Purdue University. Following graduation from Purdue in 1948, he was associated with Columbus Malleable Iron Co., Columbus, Ohio, and Swayne, Robinson & Co., Richmond, Ind. He joined Federal Malleable in 1954 as foundry superintendent.

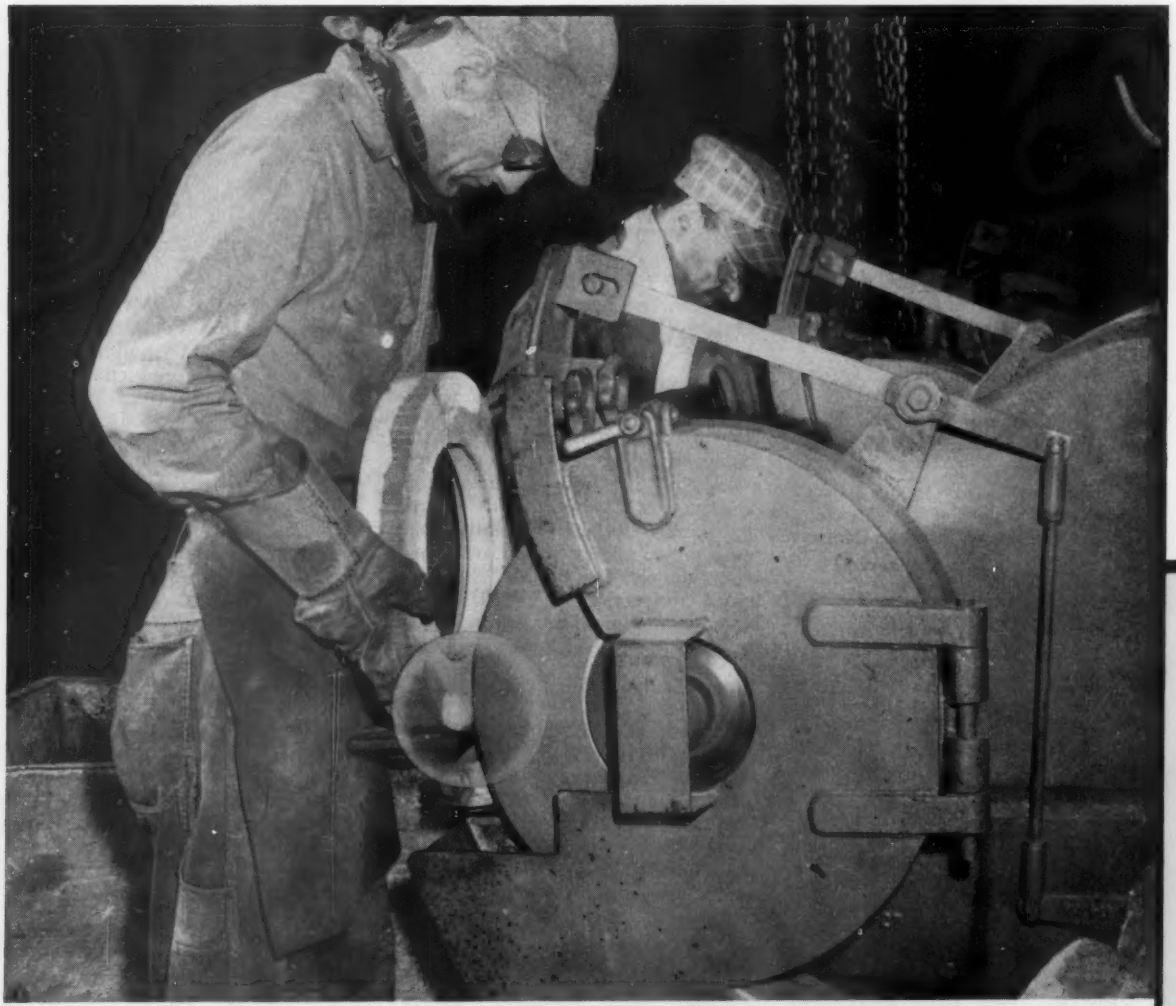
John R. Kahler, secretary-treasurer, Sandusky Foundry & Machine Co., Sandusky, Ohio, was elected president of the Toledo Control, Controllers Institute of America,

3 hard-working wheels

CRYSTOLON K bond, ALUNDUM* B-11 bond and BN reinforced wheels bring the "TOUCH of GOLD" that adds product value and cuts grinding costs*

The most reliable way you can gauge any grinding wheel's value is by its *grinding quality* — the factor which takes into consideration *both* wheel cost and labor cost.

Continuous research and testing by Norton, together with many job-reports from non-ferrous foundries, prove that for three important types



A CRYSTOLON K BOND VITRIFIED WHEEL combines the abrasive and bond that make grinding this bronze casting easier, more economical. There's no better wheel for grinding brass and bronze on any type of machine.

for soft-metal grinding

of soft-metal grinding, these three types of Norton wheels with exactly the right grinding quality provide best performance at lowest cost.

FOR GRINDING BRONZE AND BRASS, Norton CRYSTOLON K bond vitrified wheels wear at just the right rate to assure the grinding quality that means more grinding for less money.

FOR GRINDING ALUMINUM, Norton ALUNDUM B-11 resinoid wheels offer the abrasive-and-bond combination that means fastest, coolest cutting action with longest wheel life.

FOR CUTTING-OFF AND NOTCHING gates and risers, Norton BN reinforced resinoid wheels combine unusually high resistance to breakage with fast cutting action and long wheel life.

Your Norton Distributor

will be glad to help you select wheels that will add the cost-cutting, product-improving "Touch of Gold" to every grinding job, on every material and every type of grinder in your cleaning room. Ask your Norton Distributor for the booklet *Rough Grinding*. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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AN ALUNDUM B-11 RESINOID WHEEL, rough grinding aluminum castings, has the fast cutting action and long wheel life that add up to ideal grinding quality for applications on this metal.

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Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

Circle 616 on Page 51

● MAURICE D. NEPTUNE
. . . AFS Chapter chairman

● RALPH RATHYEN
. . . industrial sales mgr.

● LEON F. CORP

● ARTHUR J. KARAM
Central Foundry Div. promotions

New York. **W. E. Busker,** vice president - treasurer, Campbell Wyant & Cannon Foundry Co., Muskegon, Mich., was named first vice president of the Western Michigan Control. **Keith J. Harris,** vice president, Ross-Meehan Foundries Inc., was elected vice president of the Chattanooga Control.

● **Maurice D. Neptune,** elected chairman of the Birmingham Chapter of the AFS for 1958-59, for the last 12 years has been metallurgist, National Div., James B. Clow & Sons, Birmingham. Mr. Neptune attended Purdue University and worked in the aircraft industry before he joined the Clow company. He is a member of the Cupola Advisory Committee of the AFS.

● **James C. Richards Jr.** has been named vice president-sales, B. F. Goodrich Industrial Products Co., Akron, Ohio, succeeding **R. V. Yohe,** who has been elected president, B. F. Goodrich Canada. Mr. Richards, who joined B. F. Goodrich in 1934, has been vice president-sales, B. F. Goodrich Chemical Co., since 1952.

● **Ralph Rathyen** has been named industrial sales manager, Joseph Dixon Crucible Co., Jersey City, N. J. He will supervise sales activities of the paint, graphite and lubricants, and crucible and refractories division. Mr. Rathyen joined the company 20 years ago. For the last 6 years he has headed the crucible and refractories division.

C. J. Huffman, formerly technical specialist in the extrusions product office, Kaiser Aluminum & Chemical Sales Inc., Chicago, has been appointed technical specialist in the pig, ingot, and billet product office there.

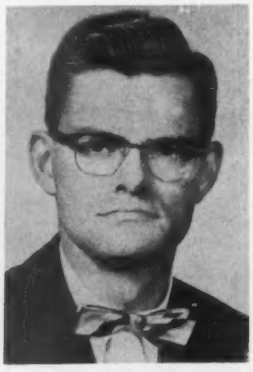
● **G. Gordon Mead** has been appointed chief industrial engineer, and **Donald G. Hazlett,** product engineer, Vulcan Mold & Iron Co., with responsibilities covering operations at company plants in Latrobe, Pa., and Lansing, Ill. Prior to joining the company last year Mr. Mead was with Clyde Cutlery Co., Clyde, Ohio. Mr. Hazlett has been with Vulcan since 1951, as a metallurgist and in production and training capacities.

● **Leon F. Corp,** since 1953 manager of the Saginaw Malleable Iron Plant, Central Foundry Div., General Motors Corp., Saginaw, Mich., has been named assistant divisional manufacturing manager. He will assist **Carl A. Koerner,** divisional manufacturing manager, in supervising manufacturing activities in the division's plants at Saginaw, Defiance, Ohio, and Danville, Illinois. Mr. Corp has been with the company since 1926. **Arthur J. Karam** has been appointed manager of the Saginaw Malleable Iron Plant. With General Motors since 1947, Mr. Karam was production manager of Saginaw Malleable for the last year.

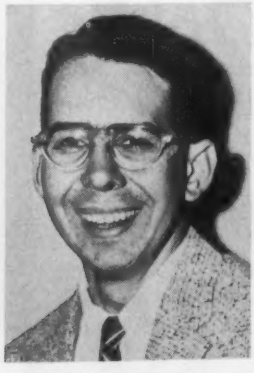
Fred T. Wilson Jr. has been appointed manager of the New Orleans office, Air Reduction Sales Co., New York. **E. C. Kennedy,** formerly a salesman in the New Orleans office, has succeeded Mr. Wilson as assistant manager of sales there.

● **Seymour Becker** has been appointed sales representative, Arcair Co., Lancaster, Ohio, to cover the

● JAMES C. RICHARDS JR.
. . . Goodrich sales v. p.



● G. GORDON MEAD

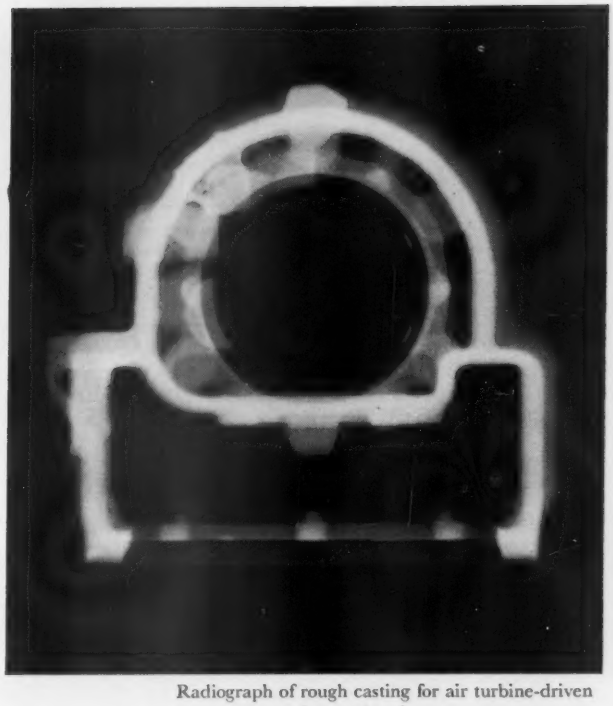


● DONALD G. HAZLETT
Vulcan Mold & Iron Co. appointments

● SEYMOUR BECKER
. . . Arcair Co. sales

Shrink caused leakage...

Radiography showed how to correct it



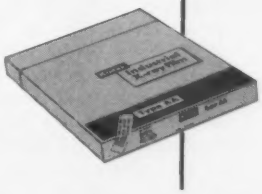
Radiograph of rough casting for air turbine-driven power supply gear housing.

This casting is the gear housing of a vital air turbine-driven power supply produced for the Utica Division of Bendix Aviation Corp. for use in jet-age aircraft. It must operate at temperatures up to 300°F with utmost dependability.

Seepage of oil through the shell was a recurring problem. And this is where radiography came in with a double-barreled assist. First, radiographic examination of the rough castings provided information to help determine whether the castings would prove acceptable when machined — *before* more than 150 machining operations were performed. Second, the radiographs revealed the cause of the difficulty—internal shrinkage—and disclosed a recurring pattern which led to placing chills so as to overcome it.

Result: a critical part became a routine production item with substantial savings in time and costs to both foundry and manufacturer.

If you would like to know how radiography can improve your own operations, talk it over with your x-ray dealer—or the Kodak technical representative.



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- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
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Circle 617 on Page 51

● THOMAS R. WALKER JR.
. . . AFS Chapter chairman

● HOWARD B. MYERS
. . . becomes division mgr.

● JACK K. SCHULTZ

● A. A. MILKIE

Pangborn district managers

New England States. He has been engaged in welding sales and instruction for many years.

● **Thomas R. Walker Jr.**, chairman of the Philadelphia Chapter of the AFS for 1958-59, is resident manager, U. S. Pipe & Foundry Co., Burlington, N. J. Prior to joining the company in 1952 he was with Warren Foundry & Pipe Co., New York, where he became vice president in charge of pipe plants and a director. Mr. Walker is a graduate of Birmingham Southern College.

● **Henry J. Calnen** has been named eastern representative, the Chas. Taylor Sons Co., subsidiary of National Lead Co., Cincinnati. Mr. Calnen will handle refractory sales in New England, New York, and northern New Jersey.

● **William E. Thornley** recently joined Jervis B. Webb Co., Detroit, as sales manager for the bulk handling division. A graduate of Alabama Polytechnic Institute, he has been a sales executive in the bulk handling industry since 1947.

● **Howard B. Myers**, formerly with Pickands Mather & Co., Detroit, has been named metallurgical sales division manager, Tennessee Products & Chemical Corp., Nashville, Tenn.

Addison Maupin, since 1951 sales development engineer, Chas. Taylor Sons Co., subsidiary of National Lead Co., Cincinnati, has been appointed sales manager.

● **William A. Geisler** has been named president of the recently incorporated Hansberg Shooters Inc., Evanston, Ill. A native of Germany, Mr. Geisler came to the United States in 1929, working in foundries in the East and Midwest until his return to Germany in 1933. In 1948 he joined Campbell, Wyant & Cannon Foundry Co. During the last few years, Mr. Geisler has been engaged in introduction of the Hansberg core and mold shooting process in this country. Hansberg Shooters Inc., of which Fritz Hansberg, Modena, Italy, is chairman, is licensed to import, manufacture, sell, and distribute the Hansberg machines.

● **Jack K. Schultz** has been appointed Philadelphia district manager, Pangborn Corp., Hagerstown, Md., with headquarters in Jenkintown, Pa. With the company 23 years, he has been Philadelphia district sales engineer since 1951. **A. A. Milkie** has been named Pangborn's Chicago district manager. He has been sales engineer in the Chicago district since 1951.

August A. Rossetti has been elected vice president-operations, and **Maurice E. Costello**, assistant vice president-sales, McConway & Torley Corp., Pittsburgh.

W. D. Staley has been elected executive vice president, Duriron Co., Dayton, Ohio. **R. A. Prosser** has been named general sales manager.

● **Andrew J. Paul**, elected chairman of the Central Illinois Chapter of the AFS for 1958-59, is assistant purchasing agent, Caterpillar Tractor Co., Peoria, Ill., directing all purchases of castings. Mr. Paul worked as a tool room machinist, toolmaker and tool designer after

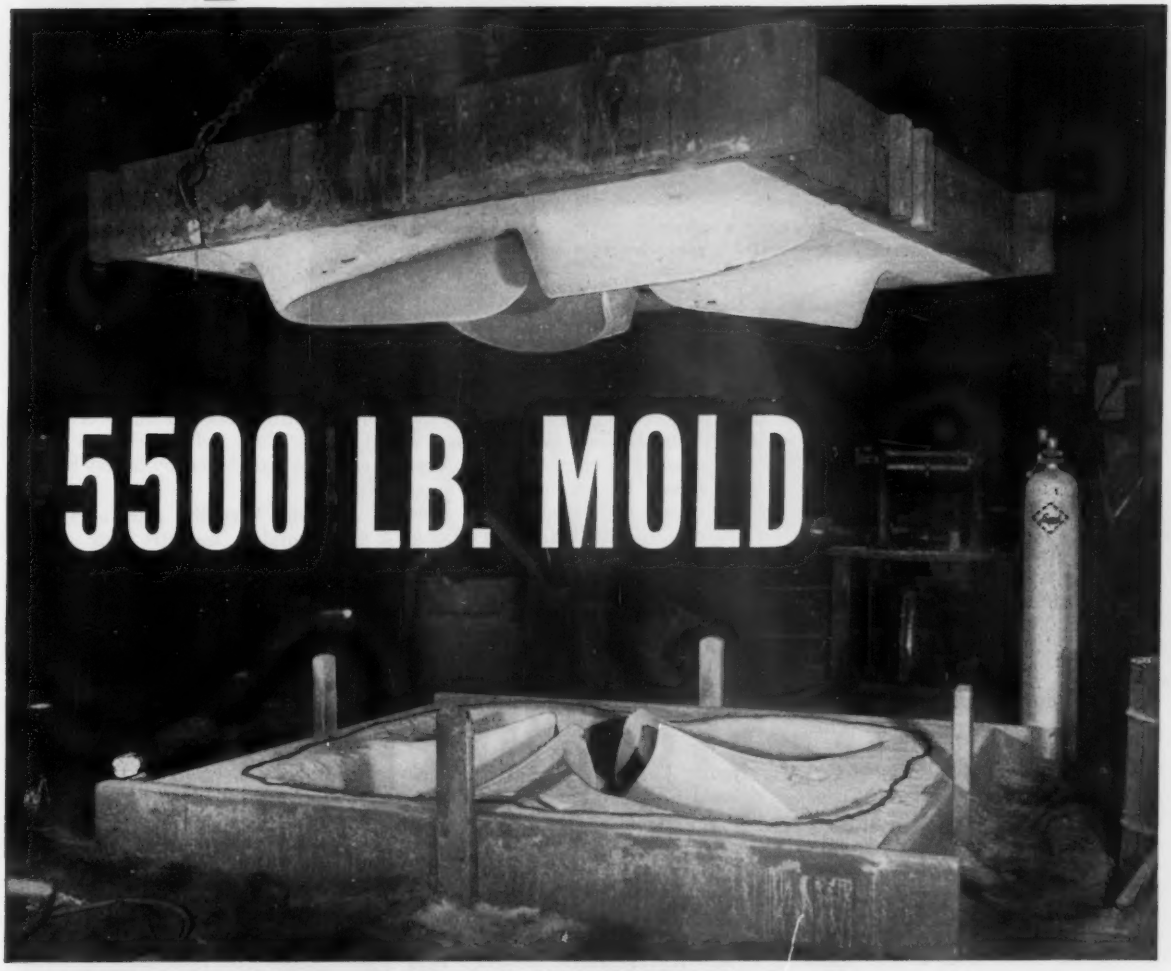
● HENRY J. CALNEN
. . . Chas. Taylor Sons sales

● WILLIAM E. THORNLEY
. . . joins Jervis B. Webb

● WILLIAM A. GEISLER
. . . Hansberg Shooters pres.

● ANDREW J. PAUL
. . . AFS Chapter chairman

CO_2 CURES



IN 40 MINUTES!

Fast, bakeless hardening of molds for large castings—like this one for 3400 pound nickel aluminum bronze propellers—is standard procedure at Columbian Bronze Corporation, Brooklyn, New York.

In addition to tremendous savings in time, Columbian Bronze reports these added advantages from CO_2 curing. no baking required • far fewer gaggers needed • elimination of need for extreme skill necessary in green sand molding • no danger of drops, soft spots or wet spots in mold • molds may be left for several days before pouring.

For complete facts and technical data on how CO_2 mold curing will revolutionize your operation, contact

World's Largest Producer of

LIQUID CARBONIC

DIVISION OF GENERAL DYNAMICS CORPORATION

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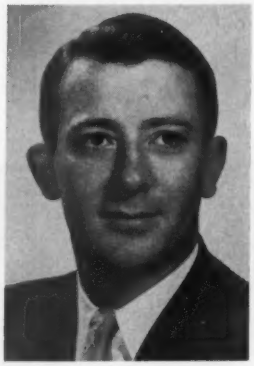
Circle 618 on Page 51

● WILLIAM I. DIETERS
. . . process control mgr.



● ASHLEY B. SINNETT

● EDWARD R. MAY

promotions announced by AFS

● WILLIAM H. ARMSTRONG
. . . joins Metal Finish Inc.

completing the Caterpillar apprenticeship course, and in 1943 was transferred to the training department. He entered purchasing work in 1948 and has been assistant purchasing agent since 1952.

● **William I. Dieters** has been appointed process control manager, Precision Castparts Corp., Portland, Oreg. He formerly was with the Fabricast Div., General Motors Corp., Bedford, Ind., and Misco Precision Casting Co., Whitehall, Mich.

J. C. Moroso, since 1956 assistant to the general sales manager, has been appointed general product manager, Electro Metallurgical Co., division of Union Carbide Corp., New York. Mr. Moroso worked in production assignments for the company until 1955 when he was transferred to sales.

Duanne R. Lamiman has been appointed New York district manager, W. W. Sly Mfg. Co., Cleveland, in charge of the branch office in Jersey City, N. J. He succeeds **Austin C. Smith,** retired.

W. D. Bailey Jr., manager of Esco Ltd.'s foundry division, Port Coquitlam, B. C., Canada, has been named a director of Esco Ltd., owned by Electric Steel Foundry Co., Portland, Oreg. Mr. Bailey, who has been in Canada for the last two years, was formerly manager of Westlectric Steel Castings Inc., Los Angeles.

Glenn M. DeBaker has been appointed sales engineer in the Milwaukee branch office, American Air Filter Co., Louisville, Ky. He formerly was with Lofte & Fredericksen, Milwaukee consulting engineers.

● **Ashley B. Sinnett,** formerly assistant secretary, has been elected secretary, American Foundrymen's Society. Before he joined the society in 1954 as educational director, Mr. Sinnett taught foundry courses at Michigan State University, where he received his master's degree. Previously he was with foundries in Texas and Michigan. **Edward R. May,** who has been assistant treasurer of AFS, has been elected treasurer. He was graduated from Northwestern University and Alexander Hamilton Institute. Mr. May was secretary, George H. Elliott & Co., Chicago, until 1952 when he joined AFS.

James J. Keeley Jr. has been appointed Philadelphia sales engineer, Oberdorfer Foundries Inc., Syracuse, to cover southern New Jersey, eastern Pennsylvania, and Maryland. **Kenneth J. Shea** has been named sales assistant in the home office of the company to serve as liaison representative between field sales engineers and foundry operating departments.

T. R. Evans has been named sales manager, Fine Metals & Chemicals Div., Electro Metallurgical Co., division of Union Carbide Corp., New York. Shortly after he joined Electromet last year he became metallurgical engineer in charge of sales when the Fine Metals & Chemicals Div. was established.

L. George Hoth has been named manager of advertising and merchandising, Borden Chemical Co., division of the Borden Co., New York. Mr. Hoth formerly was merchandising manager of the company's consumer products department, which recently was consolidated with advertising.

● **William H. Armstrong** has been elected vice president and general manager, Metal Finish Inc., Newark, N. J. Until recently he was with Minnesota Mining & Mfg. Co., St. Paul, whose Honite products are distributed by Metal Finish.

Charles Wegelin, associated with the foundry industry for many years, retired recently. Beginning as an apprenticeship patternmaker at Howard Harrison Iron Works, Bessemer, Ala., he later was foreman patternmaker at Bessemer Foundry & Machine Co., Bessemer, Sheffield Cast Iron Pipe Co., Sheffield, Ala., and American Cast Iron Pipe Co., Birmingham. Mr. Wegelin became foreman and part owner, Oakland Pattern Works, Pontiac, Mich., later joining U. S. Pipe & Foundry Co., Birmingham. He was president and general manager, Bruce Pattern & Mfg. Co., Birmingham, and vice president-general manager, Dixie Brass & Foundry Co., there. In 1931 he was named president-treasurer, Dixie Bronze Co., Birmingham. In recent years Mr. Wegelin was associated with Casting Services Inc., Birmingham.

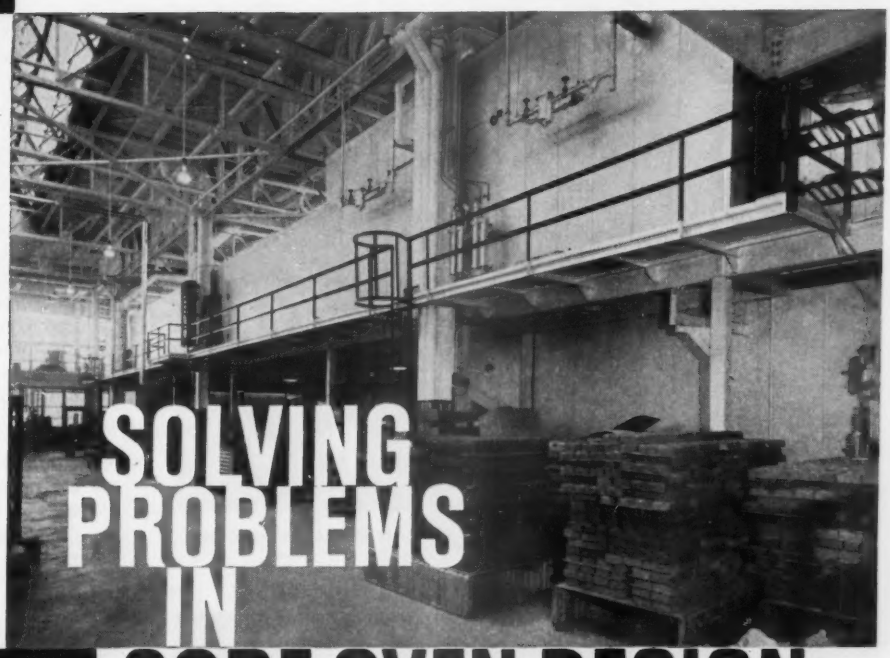
Carl L. Hecker has been elected president, Oliver Corp., Chicago, succeeding **Alva W. Phelps,** who continues as chairman and chief executive officer. Mr. Hecker formerly was executive vice president.

Donald Y. Clem, formerly with Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., has been elected vice president, McConway & Torley Corp., Pittsburgh.

Adam H. Killermann has joined Bay State Abrasive Products Co., Westboro, Mass., as sales representative in Florida, with headquarters at Delray Beach.

ROSS
Air Systems

Engineered Atmospheres for Better Processing



SOLVING PROBLEMS IN CORE OVEN DESIGN

Significant Specified Operational Data:

Rated Capacity
15,000 pounds of sand (core molds) per hour

Baking Temperature
450°F.

Baking Cycle
4 hours (4 passes)

Cooling Cycle
2 hours (2 passes) with products delivered at 110°F.

Two Composite Parallel Baking and Cooling Units
66' wide x 10' high x 110' long

One would think that to design these units so as to create and hold these temperatures continuously within close tolerances hour after hour presented problems enough. But there were others that called for all the experience and ingenuity Ross Engineers could bring to bear, problems such as gas leakage into the working areas had to be avoided . . . an air seal vestibule did this. Or sealing off the cooling areas from the baking areas yet provide continuous travel . . . utilizing a natural heat seal took care of this problem. Or thorough and uniform distribution of both the processing hot air and the cooling outdoor air . . . overhead ducts and the Ross Special Nozzle System solved this one.

This entire core curing system, installed in a large automobile parts foundry, was designed, constructed and equipped by Ross Engineers. It comes well within the scope of their broad specialized service on Engineered Atmospheres because the design, creation and maintenance of closely held baking and cooling atmospheres is the heart of the problem. Many other industries have similar problems. Ross Engineers are serving those industries, too.

Representatives:
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P.O. Box 5832, Birmingham 9, Ala.

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Die Casters Voice Optimism

At Annual Meeting of ADCI

By JACK C. MISKE
Associate Editor

OPTIMISM regarding the 1959 business outlook was expressed widely by members of the American Die Casting Institute at the group's annual meeting at the Edgewater Beach Hotel, Chicago, Sept. 10-11. They reported indications of a definite pickup in diecasting production. Nearly 400 members and guests of ADCI, the national association of job-shop diecasters, attended the meeting.

ADCI reports that the first half of 1958 saw an over-all drop of about 40 per cent in jobbing diecasting production from the same period in 1957. Low point, however, was in March and April, and less drastic losses are expected during the second half. The institute now estimates that total aluminum and zinc diecasting output, captive and jobbing, will hit about 438,500 tons in 1958, or more than 20 per cent below 1957 production. Most of the decline results from lagging sales of autos and home appliances, two major markets for diecastings. Production in 1959 will depend on demand for consumer goods.

Research Activities—First day of the meeting was devoted to activities of the Die Casting Research Foundation, the research arm of ADCI. Long and short-range research projects in the fields of die and core materials, lubricants and lubricators, process controls, vacuum diecasting, basic research, and other areas were evaluated. Future research plans also were projected. Through a technical committee of the Die Casting Research Foundation, the ADCI also is co-operating with the American Zinc Institute in research aimed at expansion of zinc diecasting applications through further improvements in alloy properties and advances in finishing techniques.

The foundation also reported on progress made in acquiring knowledge of the causes of heat checking in dies subjected to high-temperature metals. These reports are said to be encouraging and to promise the possibility of economical die casting of brass and perhaps ultimately of the ferrous metals.

ROBERT C. STRASSMAN
President

GORDON C. CURRY
Vice President

GUSTAV NYSELIUS
Doehler Award Winner

The second day of the meeting included discussion of additional production developments, reports of committees, remarks concerning 1959 metal markets, and a paper and comments on aluminum melting practices in diecasting plants.

Secretary David Laine announced that the institute has asked the antitrust division of the Department of Justice to investigate the "hot metal" contracts Reynolds Metals Co. has with Ford Motor Co. and General Motors Corp. for their diecasting and permanent mold foundries at Sheffield, Ala., and Massena, N. Y., respectively.

Under these contracts Reynolds reduces ores and produces primary aluminum on adjacent sites. The molten metal is transported directly to the Ford and GM plants. ADCI is claiming price discrimination.

Zinc Market—The zinc industry, said Charles R. Ince, vice president, St. Joseph Lead Co., New York, still suffers from an imbalance of supply and demand which causes confusion as to zinc prices. Stable zinc prices are important to zinc diecasters because the industry uses the price of certified zinc alloy as a basis for pricing its products. An upturn in zinc diecasting production is evident, however, and Mr. Ince predicted a bright long-range picture for this zinc market. One of the prime problems of domestic zinc producers has been high imports of low-priced metal.

Donovan Wilmot, vice president, Aluminum Co. of America, Pittsburgh, outlined the favorable effects of expanded domestic primary aluminum production on the future of custom diecasting. One of the effects of this expansion has been to restore the price relationship between secondary and primary aluminum to a more nearly normal basis. Mr. Wilmot expects fields of use for aluminum diecastings to continue to expand at an

CORES BY THE SCORES

Ampco® makes most of them with one Cities Service oil!

50,000 pounds of castings is all in a day's work at the foundry of Ampco Metal, Inc., Milwaukee, Wisconsin. And these castings may range from a few ounces up to 16,000 pounds each . . . **yet the cores for over 50% are made with one oil—Cities Service Delco #942!**

A talk with Adolph Klamrowski, foundry foreman would tell you why.

Klamrowski says that this one Cities Service oil can stand the long baking necessary for large cores and also has the necessary properties for small cores. In addition, Delco #942 emits a minimum amount of smoke and due to its shakeout properties prevents sand from sticking in the core boxes.

Regardless of the size or complexity of the cores you make in your operation, chances are one or two Cities Service Core Oils can do the job. Get the facts from a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, 20 North Wacker Drive, Chicago 6, Ill.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Castings from 6 ounces to 16,000 pounds are produced by Ampco for practically every conceivable use, including steel mill screw-down nuts, high pressure pump components and heavy turbine parts.

Circle 610 on Page 51

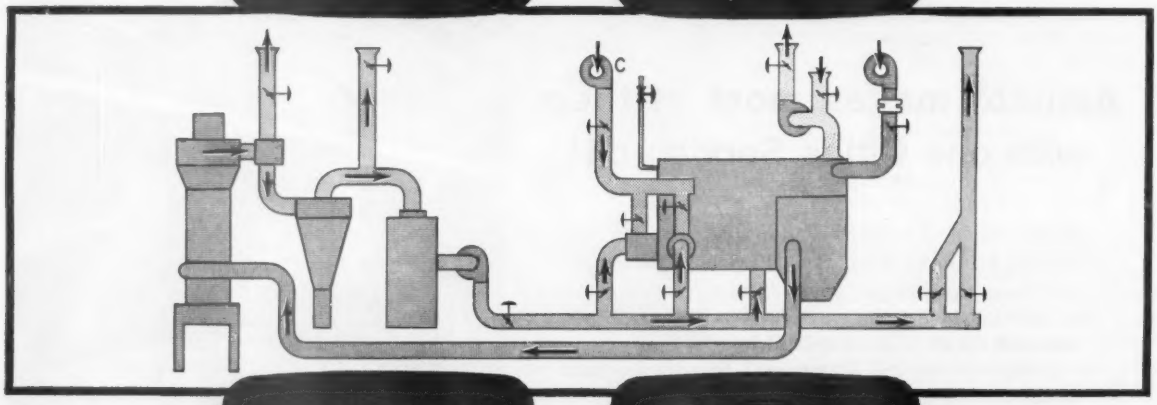
AIR WEIGHT CONTROLLERS

Performance-proved in more than 1700 successful installations. These popular Foxboro Controllers automatically "weigh" air for cupola blast . . . provide right amount of oxygen for best combustion regardless of weather conditions. Results: higher quality castings, greater productivity . . . fuel savings and less pigging.

DEW POINT RECORDERS — CONTROLLERS

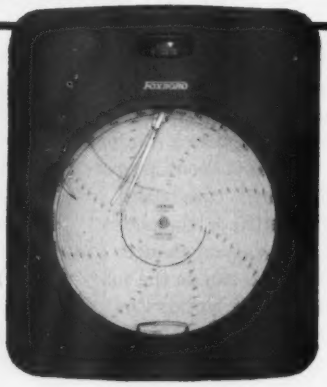
These Foxboro Instruments, with the exclusive Dewcel* measuring element, reduce coke waste and "cold metal" pours. Dew Point Recorders provide a foolproof basis for modifying the formula under varying humidity conditions. Dew Point Controllers automatically compensate for blast moisture variations on long-run heats.

*Trade Mark



PRESSURE RECORDERS

These "trouble-shooting" recorders give operators a continuous record of cupola conditions . . . show-up clogged tuyeres, bridging, fine coke sizes, etc. They're dependable, accurate, trouble-free performers.



TEMPERATURE CONTROLLERS

For precise control of cupola start-up operation, windbox blast air, dust collector inlet gas, and hot air generator exhaust gases.

Increased efficiency . . . lower operating costs with **FOXBORO COMPLETE HOT BLAST CUPOLA CONTROL**

Measuring blast air by weight, correcting blast moisture variations, detecting Cupola bridging or tuyere clogging — these are just a few of the aids to better melts you can get with Foxboro Hot Blast instrumentation. ✓ ✓ ✓ Foxboro can furnish the complete instrumentation for any Hot Blast Cupola system — simple or complex. And every instrument used will be one that's been field-proved in hundreds of foundry installations. Ask your nearby Foxboro Field Engineer for full details — or write us direct. **The Foxboro Company, 3211 Neponset Avenue, Foxboro, Mass.**

OTHER FOXBORO EFFICIENCY BOOSTERS

Blast Pressure Recorders
Auto-temperature Controllers for pre-heaters
Pressure Controllers for Exhaust Systems
Temperature Protection for Fans and Dust Collectors

FOXBORO Complete Foundry Instrumentation

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accelerated rate, particularly in the automotive industry.

The favorable price relationship of secondary to primary aluminum alloys which has existed since early 1956 will continue through 1959, according to George M. Baumann, Federated Metals Div., American Smelting & Refining Co., New York. Increasing supplies of scrap for secondary aluminum alloys and expanded primary aluminum facilities make it doubtful that industry will experience again the periods of extremely tight metal supply and extended demand which have caused prices of secondary metal to exceed those of primary metal in the past. Mr. Baumann stated that he expects aluminum diecastings to replace gray iron castings in many uses.

"Aluminum Practices in Diecasting Plants" was discussed by J. J. Stobie, Apex Smelting Co., Long Beach, Calif. Mr. Stobie described the various types of aluminum melting equipment available and the advantages of each for particular diecasting operations. His remarks were supplemented by comments from Russell Gotha, Stewart Die Casting Div., Stewart-Warner Corp., Chicago, and E. V. Blackmun, Aluminum Co. of America, Pittsburgh, who elaborated on such subjects as metal loss, fluxing, and others. All three speakers then acted as a panel to answer questions from the audience.

Educational Program — A new diecasting educational program was announced by ADCI officials. The program already is in effect at Pennsylvania State University, and plans were formulated at the meeting to extend diecasting educational assistance to other engineering schools as quickly as possible. The Penn State program includes two annual scholarships, cash prize awards for papers on diecasting, and teaching aids. The latter include a diecasting machine, a film on diecastings, and a variety of publications.

ADCI officers, directors, and regional group chairmen for 1959 also were installed at the meeting. President and vice president, respectively, are Robert C. Strassman, secretary and treasurer, Badger Die Casting Corp., Milwaukee, and Gordon C. Curry, sales manager, Dollin Corp., Irvington, N. J. David Laine and W. J. Parker, ADCI, were re-elected secretary and treasurer, respectively.

The four regional groups of the institute elected the following directors to the national board: Mr. Curry, Eastern Regional Group; R. A. Luedtke, president, Schultz Die Casting Co., Toledo, Ohio, Central Regional Group; R. A. Peters, New Products Corp., Benton Harbor, Mich., Midwestern Regional Group; and A. W. Simpson III, president, Western Die Casting Co., Emeryville, Calif., Pacific Coast Regional Group.

Directors-at-large include F. W. Burgie, manager of sales, Doehler-Jarvis Div., National Lead Co., Toledo; Alfred Schneier Jr., vice president, Advance Pressure Castings Inc., Brooklyn, N. Y.; Mr. Strassman; and L. G. Vanderhoof, vice president and general manager, Stewart Die Casting Div.

Chairmen of the regional groups for 1959 are Mr. Schneier, Eastern Regional Group; Robert I. Kopper, executive assistant, Monarch Aluminum Mfg. Co., Cleveland, Central Regional Group; Mr. Peters, Midwestern Regional Group; and R. R. Dreibus, president, Harvill Corp., Los Angeles, Calif., Pacific Coast Regional Group.

Doehler Award—Presentation of the annual Doehler Award, highest honor of the diecasting industry, to Gustav Nyselius, president, Mt. Vernon Die Casting Corp., Mt. Vernon, N. Y., highlighted the annual banquet which closed the meeting. The presentation was made by Austin T. Lillegren, vice president, Madison-Kipp Corp., Madison, Wis., who represented the institute's board of directors. The award consists of a certificate, a plaque, and a cash honorarium. It was made to Mr. Nyselius for his many contributions to the advancement of the diecasting industry—particularly his initiation of the concept of advancing diecasting techniques by co-operative efforts and the pooling of patentable developments through the Die Casting Research Foundation.

"Acme Foundry lost a good molder when it lost Kennedy!"

Circle 612 on Page 51→

WIDEST APPLICATION

Whatever your cleaning job may be, there is a size and type of Malleabrasive shot or grit of a specialized hardness to do your job best.

Whether you use centrifugal or air-blast cleaning equipment—whether you want shot finish or grit finish— whether you clean steel, gray iron, malleable, bronze or aluminum, whether for cleaning before surface coating, enameling, metallizing, galvanizing, you can have in Malleabrasive the right type to do it best.

The full and complete Malleabrasive process—used by us exclusively—enables us to combine the toughness of malleable iron with various degrees of hardness to produce abrasive "tailored" to your special needs.

Our service personnel is available to consult with you without obligation. Write us.

THE GLOBE STEEL ABRASIVE CO.
Mansfield, Ohio

Sold by Pangborn Corp., Hagerstown, Md., and by many leading distributors of foundry supplies from coast to coast.

MALLEABRASIVE

Industry Briefs

HEVI-DUTY ELECTRIC CO., Milwaukee, has purchased the Stroman Furnace & Engineering Co. from the Peterson Oven Div. of Baker Perkins Inc., Saginaw, Mich. All equipment formerly produced by Stroman will be manufactured in the new Hevi-Duty plant at Watertown, Wis. This addition will complement the furnace division purchased by Hevi-Duty in July from the Eclipse Fuel Engineering Co.

Sheboygan Castings Co., Sheboygan, Wis., has been bought by a group of five Sheboygan and Grafton, Wis., businessmen from Walter Backus, president, United States Foundry Corp., Milwaukee. The new owners are Charles and Ben Locke, Richard A. Goldberg Sr., and his sons, Richard Jr. and Chester.

Consolidated Foundries & Mfg. Corp., Chicago, has acquired Berlin Chapman Co., Berlin, Wis.

Sully Castings Ltd. is the new name of Sherratt Brass Foundry Ltd., Richmond Hill, Ont. The company recently completed a new plant and office building there at 225 Centre St. E. and has moved from its former foundry at 6 Britain St., Toronto. The company produces brass, bronze, and aluminum castings.

Dayton Casting Co., Dayton, Ohio, has been licensed by the Meehanite Metal Corp. to make Meehanite castings. It is the 63rd foundry in the United States and Canada to be licensed. There are more than 200 Meehanite foundries throughout the world.

Shaw-Box Crane and Hoist Div., Manning, Maxwell & Moore Inc., has opened new district sales offices and warehouse at 450 Bay Shore Blvd., San Francisco. Also included is a completely equipped product service and repair center manned by factory-trained personnel.

Foundry Equipment Ltd., Leighton Buzzard, England, designers and manufacturers of a wide range of foundry equipment, has appointed two new representatives. They are Alexander Britt, Romerstrasse 24, Winterthur, Switzerland, and Milciades Sanchez, consulting engineer, 415-16 Edificio Faux, 7-25 Av. Jimenez de Quesada, Bogota, Colombia, South America.

Cooper-Bessemer Corp., Mt. Vernon, Ohio, has appointed Henry P. Thompson Co., 1720 Section Rd., Cincinnati, to handle application and sale of its industrial air compressors in the Cincinnati area. Herbert A. Haas is president of Thompson Co.

Honolulu Iron Works Co., Honolulu, Hawaii, has been licensed by Sorbo-Mat Process Engineers, St. Louis, to manufacture Sorbo-Mat controlled specification castings. It is also rearranging and expanding its foundries under a program recommended by Foundry Design Co., St. Louis.

S. L. Cooper Co., franchise representative in Virginia for Yale & Towne Mfg. Co., Philadelphia, has been reorganized and expanded as the Richmond Materials Handling Corp., with headquarters at 2303 Westwood Ave., Richmond, Va.

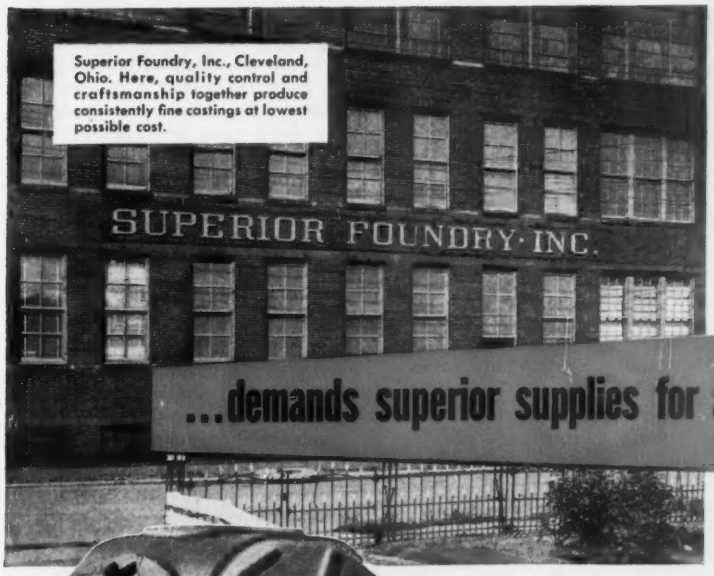
Ciba Products Corp. has been merged with the Plastics Div. of Ciba Co. Inc., New York. The former, the company's manufacturing affiliate, now will be headquarters for epoxy resin sales and service.

Acme Resin Corp., Forest Park, Ill., has appointed the M. A. Bell Co., St. Louis, as its representative for resin-coated sand and shell molding and coremaking resins.

Dollin Corp., Irvington, N. J., producer of zinc and aluminum diecastings, has appointed Manufacturers Sales Co., Greensboro, N. C., as sales engineering representative in the Carolinas, Virginia, Georgia, Florida, and eastern Tennessee.

Metal Treating Institute reports that July billings of members for commercial heat treating work totaled $2,139,600, down 24 per cent from the 1957 month. Billings for the first seven months were $17,169,000, off 26.3 per cent from a year ago.

$5 MILLION CENTER: International Minerals & Chemical Corp. formally opened its $5 million administrative and research center in Skokie, Ill., near Chicago, Sept. 8 with a series of open houses. The center includes five buildings just completed and a research center which was built on the 21-acre site in 1951. Left to right, above, are the operations building, operations annex, administration building, employees' lounge, and cafeteria. A heliport is incorporated in the administration building (note hovering helicopter) to provide quick service to airports. The center houses about 600 employees

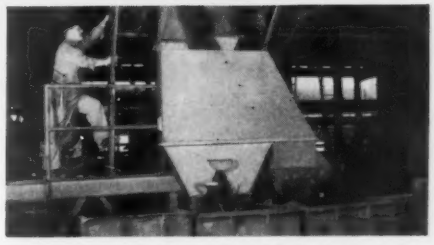


Superior Foundry, Inc., Cleveland, Ohio. Here, quality control and craftsmanship together produce consistently fine castings at lowest possible cost.

Mullers supply molding machines with seven basic facing sand mixes. CROWN HILL SEA COAL and GREEN BOND BENTONITE are introduced in varying amounts to correspond to the specific mold requirements.

...demands superior supplies for accurate control of sands

Complex castings ranging from 10 to 2200 lbs. are produced by Superior Foundry for numerous automotive, air-conditioning, and road building equipment manufacturers. Illustrated is an intricate compressor housing with critical internal dimensions and thin wall sections. It is typical of the Tiffany-like work performed by Superior Foundry, and emphasizes the need for uniform sand mixes.



Sands are reconditioned by removing fines in this sand scrubber. Reclaimed sand is reused in the facing sands. This scrubbed sand is also used with perfect results in the core room where LINOIL is employed as a binder and ADM-FEDERAL REFRACTORY CORE WASHES are used.

Quality is the watchword up and down the line at Superior Foundry, Inc., Cleveland, Ohio, where a system of statistical quality control supplements individual skill and ingenuity—intercepts errors and puts them in check before they can multiply. Control is centered in three primary areas: (1) Metallurgy (2) Pattern Design (3) Sand Mixture.

Accurate control of the molding sands is maintained through the use of statistics. In other words, Superior Foundry has learned to duplicate successful sand mixes and apply them scientifically on repeat, or similar, orders.

Important to casting quality is the uniformity of the ingredients introduced into the facing and system sands. That is why uniform ADM-FEDERAL CROWN HILL SEA COAL and GREEN BOND BENTONITE have been specified for years by Superior Foundry.

Call your ADM-FEDERAL Representative today; ask for a demonstration of CROWN HILL SEA COAL and GREEN BOND BENTONITE in *your* foundry.

CROWN HILL SEA COAL is carefully graded into six distinct grinds. It is uniformly high in volatile combustibles and extremely low in sulphur and ash content. Through rigid control of these characteristics CROWN HILL SEA COAL offers the ultimate in dependability, performance, and uniformity.

GREEN BOND BENTONITE, the purest of Western bentonites, provides the high degree of quality and consistency needed in shops like SUPERIOR where statistical quality control is employed. This material is unmatched in its natural bonding power with maximum permeability.

Archer Daniels Midland company

FEDERAL FOUNDRY SUPPLY DIVISION

2191 West 110th Street • Cleveland 2, Ohio

manufacturers of—

ADM-FEDERAL Core Washes	ADM-FEDERAL Plumbagos	ADM-FEDERAL Sand Stabilizers	CROWN HILL Sea Coal	GREEN BOND Bentonite	LINOIL Core Oils	ADCOSIL CO_2 Binders	LIN-O-SET Air-Setting Binders

SAVE!...MAKE UP A CAR OR TRUCKLOAD OF ARCHER QUALITY PRODUCTS

Circle 613 on Page 51

RUSSIA INCREASES CASTINGS PRODUCTION

Claims 80 Per Cent of United States Output

PRODUCTION of castings in Russia has increased to 80 per cent of the output in the United States, according to an article published in the Soviet magazine *Liteinoe Proizvodstvo*.

Under the title "Major Developments in Soviet Casting Industry," the article gives the following indication of the great strides made by the Russian casting industry: In 1913 the annual production per capita was 3.5 kg. By 1940 it had increased to 35 kg, and in 1956 it was 58 kg.

It is claimed that Russian production of steel castings is slightly ahead of that in this country, while output of cast iron pipe and nonferrous castings equals U. S. totals. Building of machinery is said to consume 85 per cent of all castings produced.

Seek Savings—A major concern of the Russian foundry industry is to eliminate waste of metal and labor in machining operations. It is estimated that 15 per cent of every ton of castings is removed in machining.

To increase productivity and to save on metal and labor, the Russians are attempting to develop unit casting of complex parts, and to place greater emphasis on precision investment and shell molded castings, and use of quick hardening sand binders.

At present, 50,000 tons of investment castings and 600,000 tons of shell molded castings are produced yearly. The Russians estimate that for every ton of shell molded metal there is a saving of 100 machine hours.

Attempts are being made to expand production of permanent mold, centrifugal, and diecastings. These casting methods are particularly useful for nonferrous alloys, but are said to be much less useful when applied to iron carbon alloys because of the unsatisfactory stability of metallic molds. Output of permanent mold and centrifugally cast iron alloys accounts for only 1 per cent of general production, while diecasting of ferrous materials is still largely in the laboratory stage.

Die and permanent mold casting methods account for 75 per cent of all nonferrous work. They have been found so useful in the auto, motorcycle, and toolmaking industries for zinc, magnesium, and aluminum alloys that these metals are replacing iron in certain applications.

Extensive use has been made of diecasting in producing aluminum alloy cylinder blocks for autos. These blocks, weighing 20 kg (44 lb), have permitted a 60 per cent reduction in labor cost compared with sand cast iron blocks, it is said.

Pushing Mechanization — Automation and mechanization are receiving primary attention. Today 90 per cent of all work still is manual. Mechanization has advanced furthest in preparation of molding sand and in coremaking, while considerable progress has been made in molding practices and in mechanical shakeout methods.

"The main objectives set for the foundry industry are an eight-fold increase in machinery use; mechanization not only of single processes but of the entire cycle of production; mechanization of all handling operations; greater standardization of machinery and production processes in all plants.

"While striving to surpass the U.S.A. in total production, the Soviet foundry industry must avoid the weaknesses of the U.S.A., which has a high degree of mechanization in a few industries, such as the automotive, while the rest of the industry still uses backward methods."

MISSILE CASTINGS: Cleveland area foundrymen got a closer look into the space age Sept. 11 when members of Northeastern Ohio Chapter of AFS heard a discussion of "Metals and Missiles" by Brig. Gen. Joseph M. Colby, deputy commander, U. S. Army Ordnance Missile Command. During his visit, General Colby visited Cleveland Ordnance District headquarters, as shown here. From left to right are Col. Ross R. Caldwell, commanding officer, Cleveland Ordnance District; General Colby; C. A. Newell, Small Business Administration specialist, and Maj. W. C. Harms, chief, Operations Division

Indians Plan Symposium

The National Metallurgical Laboratory, Jamshedpur, India, will sponsor a symposium, Iron and Steel Industry in India, at Jamshedpur Feb. 4-7, 1959. Purpose of the symposium is to bring together engineers, metallurgists, research workers, and consumers from India and abroad to exchange technical know-how and understand interrelated problems and mutual aspirations toward development of the iron and steel industry in general and that of India in particular.

Produces New Type Coke

The $16 million refinery of American Gilsonite Co., affiliate of Barber Oil Corp. and Standard Oil Co. of California, has completed its first year of producing gasoline and high-purity metallurgical coke from a raw material other than crude oil. The raw material is a solid hydrocarbon ore mined by hydraulic methods in Utah and piped to the refinery at Gilsonite, Colo. The low-sulfur-content electrolytic coke is used in the steel industry for carbon adjustment and in the aluminum industry where it is used by itself or blended with other cokes.

The sand in the microphoto above speaks quality. It's pure and fine, with the excellent rounded grain properties so desired for foundry use. This is indeed a superb sand —finest for foundries.

The obvious merits of quality can be yours with Wedron Silica

Send for illustrated brochure on Wedron sands.

Circle 614 on Page 51

NATIONAL MOLDER'S HELPER

It's an "Elevayor"

This unique National-patented equipment item will deliver a full mixer batch from discharge door to bin within 20-30 seconds. Can be designed to receive charge from front end loader too. Shoveling or extra handling is *completely* eliminated.

Use it with any Mix-Muller

You've already cut your costs if you're now a Mix-Muller user! Molder's Helper can be used with any Model Mix-Muller (1F to 2½F)

Molder's Helper with 1½F Mix-Muller handles 1000 lb. batch. Is equipped with two 50 cu. ft. hoppers.

It's an aerator!

Upper section of "Elevayor" automatically aerates sand. Another step eliminated, another item of equipment and labor that's *built-in* with this low cost mechanized National "package" unit.

It's overhead sand

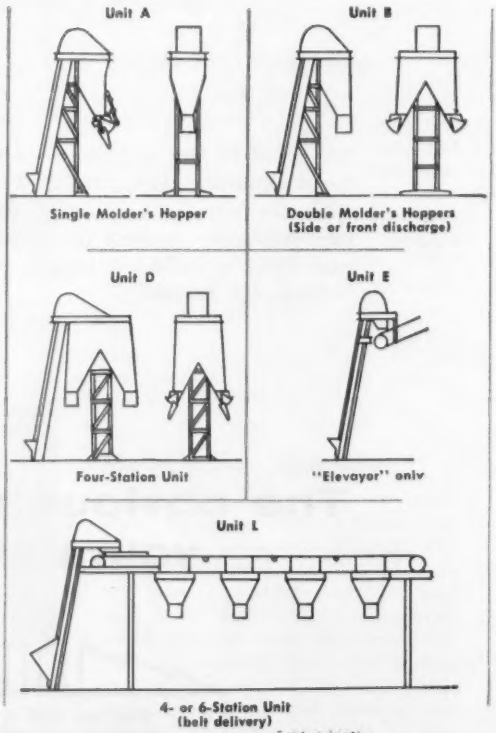
Sturdy, NATIONAL Molder's Hoppers receive fluffy, aerated free-flowing sand ready for molding — in seconds. Units available for 2, 4 or 6 molders stations. Riddling and shoveling are eliminated to cut molder's time up to 50%.

It's National Quality

The Molder's Helper is a *foundry* proven item. Its design, fabrication and performance characteristics reflect the same quality of workmanship that is found in all National-engineered components.

Many arrangements possible

Other arrangements available to suit specific requirements.



Now any foundry can afford to have overhead sand!

The National Molder's Helper is designed to eliminate the costly time and labor consuming job of hauling sand from mixer to molder. With it, you can bring overhead sand to the smallest operation; *increase* molders production up to 50%; *eliminate* floor shoveling and *concentrate* your entire mixing and molding operation into no more floor space than one molder now occupies.

Cold hard *dollars* saved in increased efficiency, lower labor costs and better, more flowable sand—can quickly pay the small cost of the Molder's Helper. *But what's more* any foundry with a Simpson Mix-Muller already has a head start in equipment. Write for further details today, or let your man from NATIONAL give you an estimate.

NATIONAL ENGINEERING COMPANY

Machinery Hall Bldg.

646 Chicago 6, Illinois

Circle 615 on Page 51

ANOTHER! PROVEN PRODUCT OF THE PRACTICAL FOUNDRYMAN BY NATIONAL

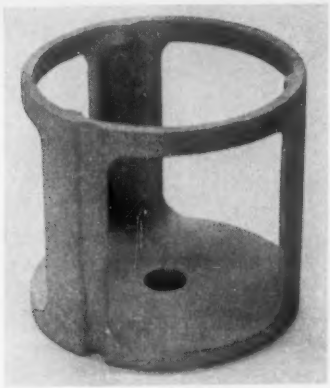


Fig. 1—Gyro compass housing presented problem of casting lugs at open end without shrink defects

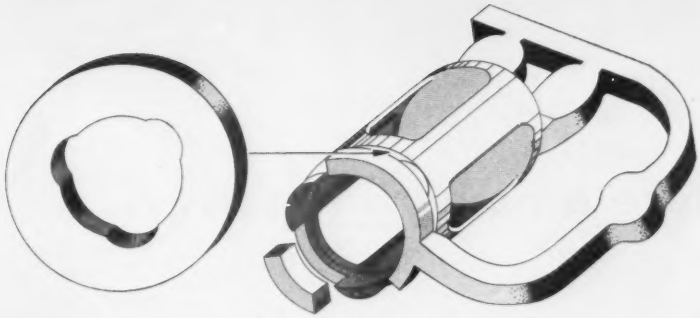


Fig. 2—To reduce size of contact for cutoff purposes, 3-slot secondary ring core (left) was used between feed ring and castings. Lugs were fed through slots

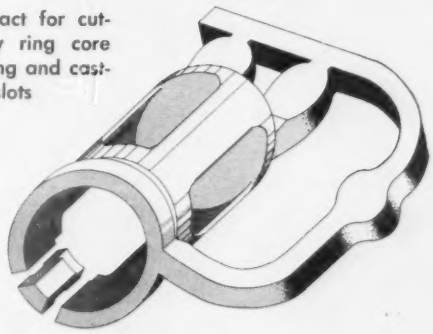


Fig. 3—Use of ring contact around feed instead of slotted second core increased cutoff time, but cut over-all time 50 per cent

Routine Production Castings Offer Potential Savings

By **HERMAN KRETZ**
Assistant Manager, Production Engineering
Cooper Alloy Corp., Hillside, N. J.

HOW many repeat-order castings have you re-examined lately to see whether your present method of producing them is the most economical one? A standpat attitude on a bread-and-butter job often can cost you money without your realizing it. Periodic review of a routine job for a well-established customer may reveal a better way of making the castings which will mean savings to you and enable you to maintain existing prices in the face of rising manufacturing costs.

Obviously, the new and improved techniques which are becoming available continually are important considerations in these cost and method re-evaluations. An additional help is the knowhow gained by actually having produced the casting. The approach which looks the best on paper is not always the best in practice. This difficulty is overcome by periodic reappraisal of the job after it has been in production.

The Planning Board—At Cooper Alloy, these rechecks are conducted by a planning board consisting of a member of the production engineering department, the general foreman, and a representative of the pattern department. Before rerunning any job which has been made previously, the planning board meets for a brief examination of the pattern. The men discuss possible design or production modifications in the light both of new developments and past experience in producing the casting. The system is simple and efficient and involves maximum control with a minimum expenditure of manpower and time.

Case in Point—A few years ago a customer called on us to produce a close-tolerance, thin-walled casting to be used as a gyrocompass housing. (Fig. 1). The casting had been attempted previously by a number of other foundry sources without success. The problem centered around one area, the open-faced end of the casting. There were three lugs on this open-faced area, and all efforts to cast them had resulted in shrink defects.

The material was a chromium-nickel stainless steel conforming to ACI-CF8 (Cooper Alloy 17), which is similar in composition to AISI 302. The casting weighed 1¼ lb, and concentricity of OD was to be within 0.015 T.I.R. with wall sections as thin as 0.070. Surface finish requirements called for 200 rms (absence of depressions which would cause casting to deviate from design tolerance.)

Design conferences were held with the customer, and modifications were suggested by our foundry engineers. With these changes accepted, the pattern equipment was designed, sample castings made, and the pattern equipment further tailored to achieve the desired dimensional accuracy. Since both interior and exterior surfaces were critical, the casting was made with a shell mold and a shell core.

Actually there were two cores. The basic core shaped the interior of the part, and the secondary core was a ring which fit around the first. During the feed, metal flowed through these slots to feed the troublesome lugs. Purpose of the ring core was to reduce the size of the contact for cutoff purposes (Fig. 2).

With this technique, the difficulty was solved and the casting produced to the customer's satisfaction.

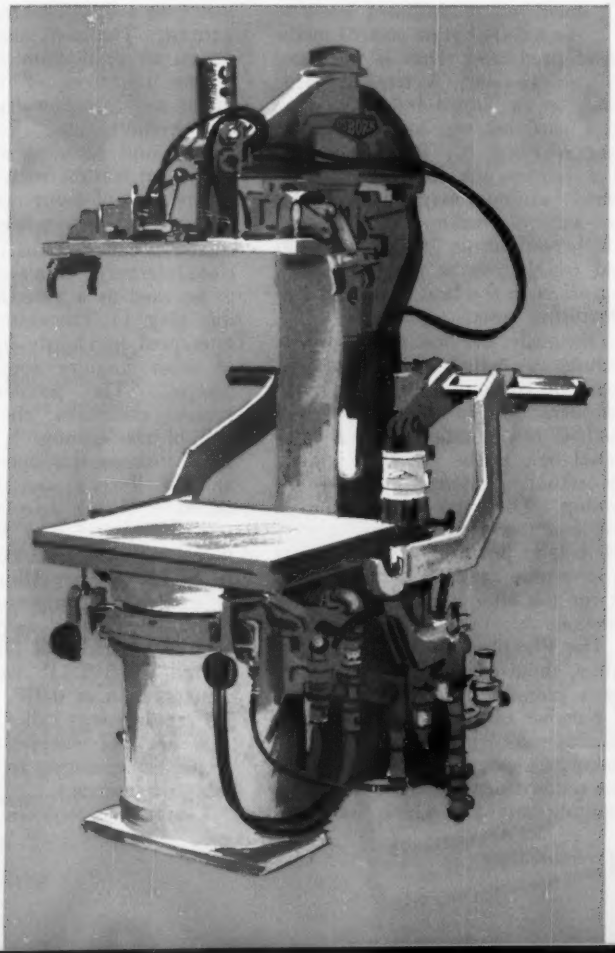
Why Change?—Although it was a difficult job, there was no apparent reason to re-evaluate either the method of production or the economics. The customer was satisfied, and the foundry was realizing a profit.

Before the job was rerun, however, the planning board met to consider whatever problems might have come up in making the cast-

Here's how one man . . .

. . . one **OSBORN ROTA-LIFT®** . . .

can turn your large match-plates into profits!



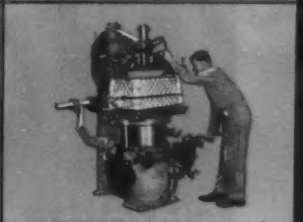
Circle 616 on Page 51

Here's how the OSBORN ROTA-LIFT mechanizes match-plate molding

ROLLOVER *arms are raised—lifting flask on split trunnions for quick, simple operation.*

DRAWING COPE *takes place on return stroke of squeeze piston. Pattern plate is vibrated during draw.*

HANDLING COPE *while pattern is manually drawn from drag mold. Left knee valve operates pattern plate vibrator, leaving both hands free for drawing drag pattern.*



CLOSING MOLDS—*cope is swung into closing position and drag raised until it contacts cope. Finished mold is ready for transfer to conveyor or floor.*

MOLDS formerly considered too large for match-plate molding can be handled on the Osborn Rota-Lift. With the Rota-Lift one man performs *all* the operations that once required two men. But that's not all. Molds are of uniform quality... and there's less operator fatigue to assure more production per man-hour . . . lower cost per mold.

These unique advantages make the Osborn Rota-Lift a profitable investment for any jobbing or semi-production foundry. For full details, write *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Specify OSBORN leader in mechanization for the foundry

MOLDING MACHINES • CORE BLOWERS • SHELL MOLDING MACHINES • BRUSHING MACHINES • INDUSTRIAL BRUSHES

MEMBER FEMA

H
W
Known By The
Company We Keep
As sales representatives for America's leading producers of quality foundry commodities, we are especially proud of our association with The Woodward Iron Company, the nation's largest independent producer of highest quality foundry and malleable pig iron since 1882.
For details see your H. W. Buyers Guide
WOODWARD IRON COMPANY
Hickman, Williams & Co.
(INCORPORATED)
CHICAGO · DETROIT · CINCINNATI · ST LOUIS · NEW YORK
CLEVELAND · PHILADELPHIA · PITTSBURGH · INDIANAPOLIS
Established 1890

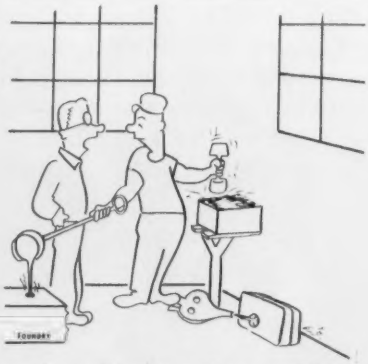
ings in this way. They asked these questions: What was the time involved in producing the secondary ring core? How difficult was it to place this ring on the primary core? What was the rate of breakage? How troublesome was it to make the slotted mold that was required with the ring core? These operations were translated into costs, and a total figure was arrived at.

An alternative method then was considered. With a ring contact around the entire feed and instead of the three feed pad contacts through the second core, this core would be eliminated, although cut-off time would be somewhat greater (Fig. 3). The planning board studied the cost of this alternative operation and found that it would be approximately one-half that of producing the casting with the ring core.

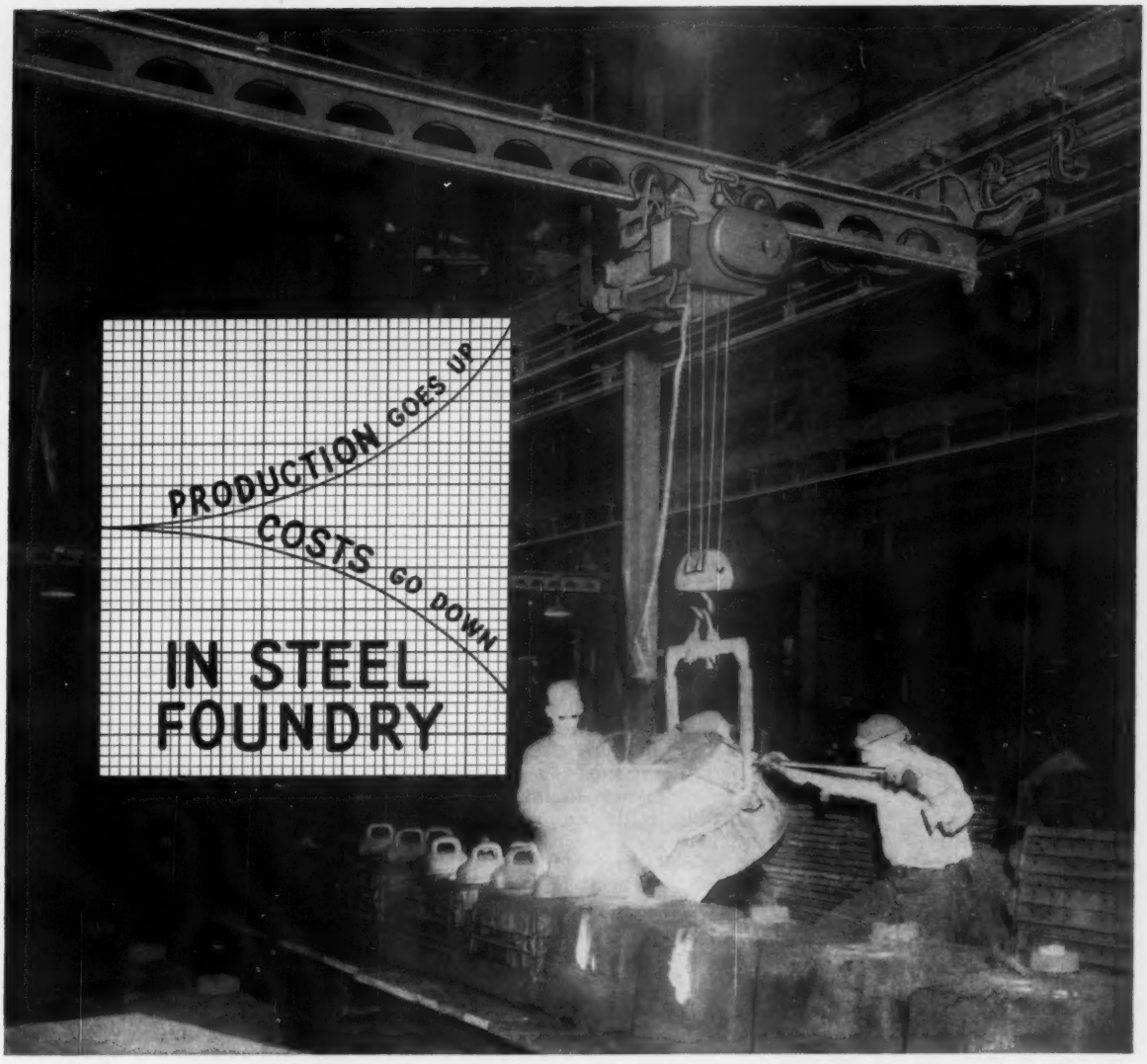
The former method, which had originally appeared to be the most practical and economical, was rejected in favor of the less expensive alternative. The planning board's routine second look, after actual production experience had been gained, resulted in savings which easily could have remained hidden in a routine job.

Maintenance Show Is Planned

The Plant Maintenance & Engineering Show and Conference will be held at Public Auditorium, Cleveland, Jan. 26-29, 1959. This is the tenth annual event. Exhibits will be devoted to the demonstration of equipment and products designed to keep plants and machinery in operation. Conference sessions will deal with maintenance methods and problems. Advance registration cards for the show or conference may be obtained from Clapp & Poliak Inc., 341 Madison Ave., New York 17, producer of both events.



"You still can't go home early!"



When a large Steel Foundry installed an overhead Cleveland Tramrail system to serve its pouring floor two significant things happened: (a) production increased greatly, (b) costs went down.

Factors contributing to these results were:

1. Enabled use of larger pouring ladles
2. Provided efficient working routine
3. Reduced delivery time of metal to molds
4. Decreased heat loss in metal
5. Eliminated much hand lifting, lugging and hard labor
6. Minimized worker fatigue
7. Promoted safety

Because of the phenomenal success with the pouring floor installation, Cleveland Tramrail was installed in other departments with equally remarkable results. In nearly every instance the equipment paid for itself within the first six months of operation.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3804 East 286th St. Wickliffe, Ohio

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Circle 740 on Page 51

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

RAPID differentiation between 200 series (low Ni, high Mn) and 300 series (18-8) stainless steel scrap can be accomplished by a simple spot test devised by the Research and Development Analytical Laboratory, Electro Metallurgical Co., Niagara Falls, N. Y.

Procedure is to place two drops concentrated nitric acid, followed by one drop concentrated hydrochloric acid, on the specimen to be tested. After reaction has subsided, two drops of water are added and mixed in with a glass stirring rod. Add a pinch of sodium bismuthate and mix with rod. If all bismuthate dissolves, add small portions until excess reagent is present. After 30 to 60 seconds, the 200 series steel will show a dark reddish-brown spot, while the 300 series will show a tan spot.

Withstands Heat

NEW high-temperature alloy has been developed by General Electric Co. for use in severely stressed jet engine components. Called Rene 41, it is a nickel-base alloy hardened with titanium and aluminum. Strength tests of the alloy with optimum heat treatment are said to show the 0.2 per cent offset yield strength at 1200° F is 125,000 psi, and 100 hour stress-rupture strength at 1600° F is 25,000 psi.

Elevated Temperature Tests

COMPILATION of data on short-time elevated temperature properties of selected light alloys applicable to airframe and missile fabrication is presented in "Materials-Property-Design Criteria for Metals; Part 6—The Conventional Short - time Elevated - temperature Properties of Selected Light Alloys" by Achbach, Favor, and Hyler. Designated report PB 131515, the alloys and conditions include 2014-T4 and T6; 2024-T3,-T4,-T6,-T36, -T81, and -T86; 2218-T61; X2219-T6; 7075-T6 aluminum alloys; HK31A-T6 and HK31A-H24 magnesium alloy, and Ti (8Mn) titanium alloy. Short summary of alloy technical data and a description of each alloy also are presented. Report may be secured from the Office of Technical Services, U. S. Department of Commerce, Washington 25, for $6.

Inverse Grayness

INFLUENCE of a number of factors on the incidence of inverse grayness in blackheart malleable iron was investigated by C. T. Moore and reported in the June, 1958 *BCIRA Journal of Research and Development*, Birmingham, England. Conclusions were that boron up to 0.005 per cent was ineffective in reducing inverse grayness in thin appendages but did reduce normal mottle in heavy sections. Bismuth less than 0.001 per cent completely eliminates inverse grayness in fins and normal mottle in the bar section (1.2 in. diam) of the test castings.

Molds treated with tellurium wash produced completely white test castings in which only 0.0002 per cent Te was detected. Inverse grayness and normal mottle was reduced when sulfur content of the metal was increased. When sulfur was in excess of that required to balance manganese, completely white castings were obtained. Inverse grayness was increased by additions of ferromanganese—high-carbon FeMn producing more than the low carbon FeMn. Inverse grayness showed no relationship with coal dust content of the molding sand. It occurred in varying amounts and irrespective of coal dust content.

Reports on Nodular Iron

SEVERAL reports relating to studies of nodular cast iron are available from the Office of Technical Services, U. S. Department of Commerce, Washington 25. One is entitled "Investigation of Nodular Cast Iron Manufactured in the Springfield Army Casting Laboratory" by O. Lubinkowski and designated PB 131399. It contains 45 pages and the price is $1.25.

Another is "Alloying and Heat Treating Ductile Cast Iron. Final Report" by Massachusetts Institute of Technology for Watertown Arsenal. Designated PB 131350, the report contains 95 pages and the price is $2.50.

A third report is "Fatigue Studies of Quenched and Tempered Nodular Iron" by P. E. Goettsch and is designated PB 131495. Containing 18 pages the price is 50 cents.

"Spectrographic Determination of Magnesium in Cast Iron" by Springfield Armory is the title of a fourth report which is designated PB 131545. It contains 11 pages and the price is 50 cents.

Uniformity in Drafting

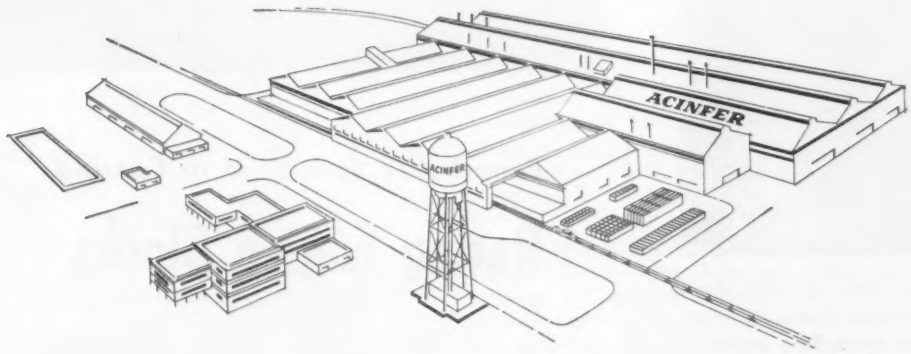
FIRST seven sections of American Drafting Standards Manual Y14 have been approved and published, according to the American Standards Association, New York, and ten sections still are in preparation. Sections available are on size and format, line conventions, projections, pictorial drawing, dimensioning and notes, screw threads and gears, splines, and serrations. Sections in preparation are on castings, forgings, metal stampings, plastics, springs, structural drafting, electrical diagrams, tools, dies, gages, and hydraulic and pneumatic diagrams.

Heat Resistant

CHROMIUM-NICKEL alloys containing 35 to 70 Cr with additions of Fe, Mo, and Cb were precision cast and tested in stress-rupture at 1600 to 1800° F, according to a recently issued report. Characteristics said to surpass those of many commercial alloys were obtained especially in alloys containing 40 to 45 Cr, 2 to 10 Fe, 2 Mo and 2 Cb. Higher Cr alloys exhibited high hardenability which might enable high-temperature bearing application. Data are available in "Chromium-Nickel Alloys for High-temperature Applications" by Bucklin and Grant which is designated report PB 131465 and can be obtained from the Office of Technical Services, U. S. Department of Commerce, Washington 25, for 50 cents.

A Lester B. Knight & Associates, Inc. Case History

ACINFER, S. A. PLANT ENGINEERED BY KNIGHT...



...JUDGED MOST MODERN IN ARGENTINA FOR 1958

The Knight organization had overall responsibility from planning to successful operation of a large malleable and grey iron foundry and machine shop recently awarded a Diploma of Honour by McGraw-Hill's "Ingenieria International Industria" as the most modern industrial plant in the Argentine Republic. This integrated production-jobbing plant, the largest in South America, was designed by Knight engineers who purchased and shipped the facilities, supervised installation and furnished a team of U. S. foundrymen to operate while training Argentine personnel to take over. The Knight organization has designed plants and developed modernization programs for more than 700 clients in various parts of the world.

For consultation on any modernization program call on Lester B. Knight & Associates, Inc.

KNIGHT SERVICES INCLUDE:

Foundry Engineering • Architectural Engineering • Construction Management • Organization Management • Industrial Engineering • Wage Incentives • Cost Control • Standard Costs Flexible Budgeting • Production Control • Modernization • Mechanization • Methods Materials Handling • Automation • Survey of Facilities • Marketing

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Knight Engineering Establishment (Vaduz), Zurich Branch, Bahnhofstrasse 17, Zurich, Switzerland

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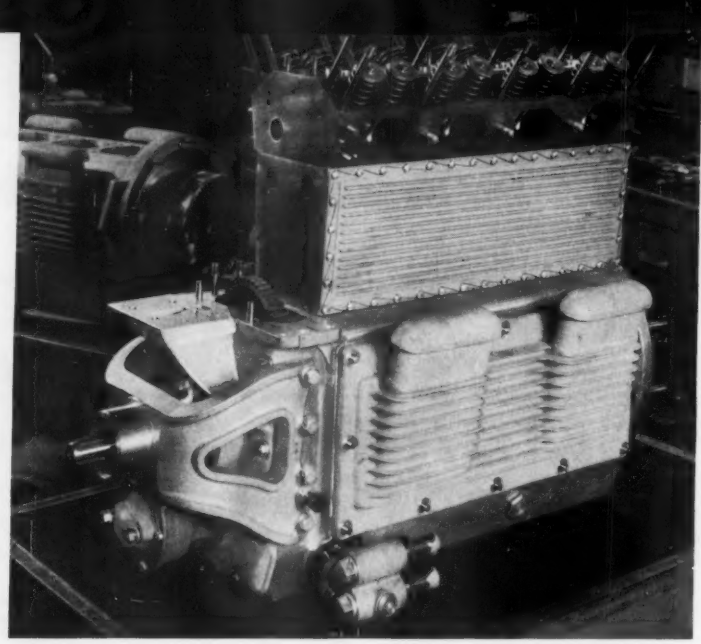
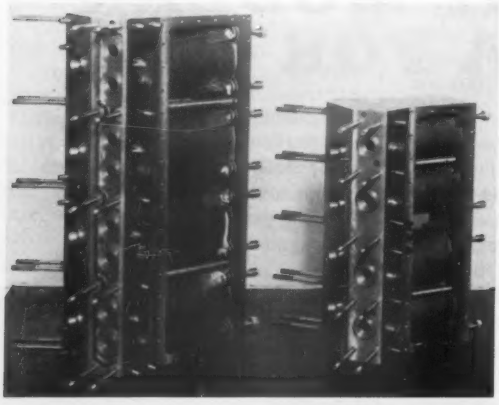


Racing engine is shown partially assembled. Such engines usually have four cylinders and are capable of developing over 300 hp

Cutaway view of block shows integrally-cast head, eliminating need for a head gasket

Foundry Is Specialist in Casting

Racing Engine Blocks



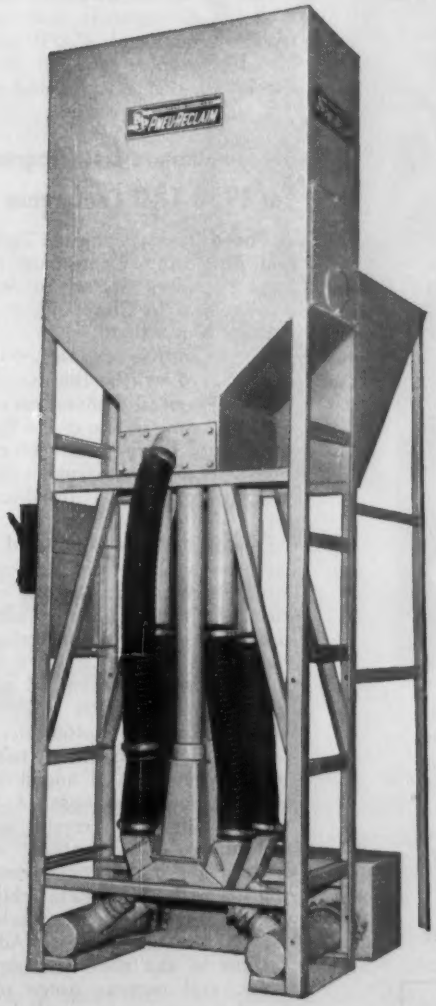
The 300-hp block, left, is shown with a smaller block at right used in engines incorporated in many midget racing cars

ENGINES built with block castings poured at H. C. Macaulay Foundry Co., Berkeley, Calif., have been dominating American race tracks, including the Indianapolis Speedway, for nearly 40 years. Originally made by Harry Miller and later by Fred Offenhauser, whose name usually is associated with them, the engines now are manufactured by Meyer & Drake Engineering Corp., Los Angeles. Macaulay always has made the block castings.

The first engine, a straight eight, enabled Jimmy Murphy to win the Indianapolis race in 1921. A great many designs and models have been built since, including four, six, eight, and sixteen-cylinder engines, usually using the four-cylinder block in various combinations. In recent

These are typical integral block and head castings as shipped by the foundry to the engine maker

IS YOUR FOUNDRY DUMPING OVER $12,000 IN RECLAIMABLE SAND THIS YEAR?



EVEN SMALLER FOUNDRIES DO...

Large expenditures for new sand aren't limited to the larger foundries. Many foundrymen are surprised and even shocked when they calculate the cost of new sand in their foundry operations. One typical medium-size foundry revealed these figures:

Cost of new sand per ton at siding	$5.83
Cost of moving sand to storage, per ton	.65
Cost of storage, per ton	.25
Cost of trucking used sand to dump, per ton	.55
Total cost, per ton	$7.28
Total cost per month (based on 150 tons/month)	$1,092.00

Of course, bigger foundries spend more . . . much more. Yet, the sand hauled to the dump is perfectly reclaimable for use as new sand. The sand dumped represents dollars lost forever . . . dollars that a reclamation unit could save.

NOW—RECLAMATION COSTS LESS

The newest of dry reclamation units—Pneu-Reclaim—actually costs less to install and use than earlier units. Its many exclusive features—dual-jet scrubbing, high recovery fines control, level-flow and simple quantity-quality control—mean lower-cost operation and superior peformance. The typical costs shown below are based on hundreds of actual tests:

Typical cost of reclaiming for reuse in molding sand mixtures, per ton	30c
Typical cost of reclaiming for reuse in core sand mixtures, per ton	90c
Typical cost of reclaiming for reuse in CO_2 sand mixtures, per ton	60c

These costs include all of the charges for power, maintenance and operation. Because Pneu-Reclaim *requires half the air pressure for operation, it consumes half the power required by earlier units.*

AND SAVES MORE!

It's easy to find how much Pneu-Reclaim can save your foundry. Simply compute the actual cost of each ton of sand delivered to your foundry, used in your system and then discarded, and subtract the cost of reclamation. The difference represents the saving offered by Pneu-Reclaim per ton of sand reclaimed and used in lieu of new sand.

TYPICAL EXAMPLE

Cost per ton of sand delivered, used and discarded	$7.28
Cost per ton of sand reclaimed for reuse in molding sand mixtures	.30
Saving per ton	$6.98
Saving per month (based on 150 tons/month)	$1,047.00

A no-obligation demonstration will prove these facts for you. Write today!

B&P PNEU-RECLAIM

Beardsley & Piper
Div. Pettibone Mulliken Corp.
2424 N. Cicero Ave. • Chicago 39, Illinois

Circle 620 on Page 51

Cylinder head castings for diesel engines are elevated by an operated lift section at left to height required by processing machinery. Connecting spur line is hinged and counterweighted to permit passage of operator to and from work station.

Trimming costs to meet competition? The solution is mostly in your shop. With so much importance on the production end, it's small wonder that management is giving more and more attention to materials handling. Logan Conveyors have been the key to greater savings in time, space and effort for large companies and small for over a half century. Production experts who specify Logan, expect and receive equipment designed for sound day-after-day performance.

Why not see what Logan can do for you? Write for more information or for a call from a qualified engineer.

Write for your copy of the Logan TROLLEY CONVEYOR catalog

LOGAN CO., 580 CABEL ST., LOUISVILLE 6, KY.

Logan Conveyors

years, the engines in Indianapolis Speedway cars have been four-cylinder powerplants which have developed more than 300 hp. The Offenhauser engines have won every Indianapolis race since 1947 as well as many before then. Ordinarily, virtually every car in the race has been powered by this engine.

Except for many refinements, the original design has remained basically unchanged. It includes a cylinder block with the head cast integrally, as shown in an accompanying illustration. This design eliminates the need for a head gasket.

The metal specifications call for a nickel-chrome-moly iron with a tensile strength of 45,000 psi and brinell hardness of 210 to 240. Blocks are cast in core sand molds.

Steel Founders List Program For 1958 T&O Conference

The thirteenth annual Technical and Operating Conference of the Steel Founders' Society of America will be held in Cleveland, at Hotel Carter, Nov. 10-12.

Among other new techniques to be discussed will be the use of television to control demand on electric melting furnaces, use of the Spectromet, large source—cobalt 60 radiography, and automation as applied to conditioning and distribution of sand.

The leaded cast steels and nodular iron will be given significant attention with comparisons of acid electric practice, basic cupola, and the high-frequency induction furnace.

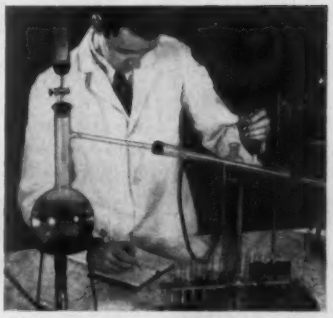
Increasing use of metal and refractory mold inserts will be covered in papers on molten metal passages using refractory tubes in molds, water-cooled metal inserts, water-cooled cores, use of heavy-walled pipe for certain molding techniques, solidification control with metal inserts, rules governing the use of internal metal chills and a discussion of proper techniques for the use of chaplets. Advances in use of the shell technique for cores, and current usage of CO_2 for the same purpose will be related to production operation.

I. M. Emery, Massillon Steel Casting Co., Massillon, Ohio, is chairman of the society's Technical and Operating Committee sponsoring the conference. Staff director of the conference is C. W. Briggs, technical and research director of the society.

Comes out better with

KOPPERS *Premium Foundry Coke*

You'll have fewer rejects—far better quality castings when you switch to Koppers Premium Foundry Coke. Car after car, Koppers delivers a superior coke that's absolutely *uniform* in *size, strength, structure* and *chemical analysis.* Because of the higher carbon content in Koppers Premium Foundry Coke, the foundryman can maintain a higher temperature range which increases the cleanliness of the iron. This in turn, helps reduce fuel consumption—means lower operating costs all around. Next time order Koppers Premium Foundry Coke. Available anywhere in the U.S. or Canada in sizes to meet your needs. Koppers Company, Inc., Pittsburgh, Pa.



WE CHECK EACH DAY'S RUN to make certain you get foundry coke of the exact size and chemistry that is most efficient for the job. Analyses are available to your foundry on request.

Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"Even in times like these, a foundry can do right smartly for itself in holding a high standard for the everyday chores it does"

Within the Means

I IMAGINE that many of you are getting rather fed up at my preaching at the slightest provocation about "The magic of living and working within your means of time, talent, opportunity and money." But in spite of the danger, I guess I'll have to go on—right now, in fact, with an example.

Last week I visited a fine bunch of fine foundrymen in just about as fine a foundry as I ever visited (Urick Foundry, Erie, Pa.). Please keep in mind that I'm still an amateur and that the things which make a deep impression on me might not be nearly so exciting to some sophisticated professional foundryman of parts and deep penetration. Like those who write technical papers on layouts, automation, and stuff like that.

As my host was ushering me into his plant, I said, "Hey! Just a minute, please. I always like to stop for sort of a panoramic scanning of a foundry before I go barging in. I like to get the feel of it from an over-all look."

My host said, "Why sure, help yourself."

Lots of foundries slick up the front, but I wanted to see the yard. Boy! you sure can get onto the personality of a foundry by seeing the backyard. You pretty nearly can tell from it without even going inside what sort of an outfit it is.

My host said, "Well?"

"Splendid, splendid, splendid, splendid," I replied.

"What's splendid?" he asked.

"I've never known it to fail," I said, "that when the backyard of a foundry is just as neatly kept as the front yard, you can bet your sweet life that you've got a real outfit." I wondered out loud whether the backyards of most foundries that go bankrupt are a disgrace.

The inside was, of course, just as orderly as the outside, including the top man's desk and his hair. In spite of his being very busy, his manners were the same (neat). Without seeming to cut me short, he gave me the run of the place, and I soon was on my way through the plant with my host.

Another one of my many peculiarities is that I prefer to go through a foundry back-end-to—that is, I like to start with the shipping department. It so happened on this occasion that my host had planned to do just this. Maybe all foundry visits should start this way. After all, if you can find out what the shootin' is all about, you're better able to appreciate the shootin'—particularly foundry greenhorns.

"One of my many peculiarities is that I like to go through a foundry back-end-to"

I pushed my guide to one side and started to manhandle the castings I could lift. They looked good to me—fine finish, freedom from dirt, sound in spite of being highly imaginative designers' monstrosities (some of them were truly doozies). The corners struck me with radiuses well down on the fraction list. I know that this was far from just luck. Sand, pattern, gating, lifts, pouring, and what have you must have had to co-operate. At least, that's the way it struck me.

In my crude, amateurish way I think I know what a chore it is to get set up so that cores will fit the prints and vice-versa. From what I saw, these boys must have had a few tricks up their sleeves. I hinted as much to my guide, whereon he said with an eye twinkle, "Come with me."

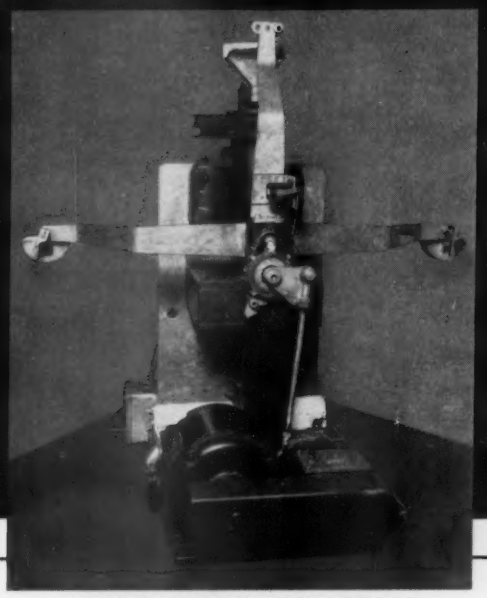
He showed me a mold made in a standard production flask, with a pattern for green sand, but made with core sand and baked. "Now you see, Doc, that we can mess around with prints and cores knowing pretty much where we're at since a green sand tryout mold will not stand the gaff.

"Hooray for you; that's slick," I said, keeping in mind that there are lots of good things I haven't seen. You bet your sweet life, we're going to swipe that little stunt for the Lee Hobby Foundry.

This demonstration put us in the

CLEVELAND is the name and the place for ABRASIVES

Why not buy Abrasives on Fact?



Here at Cleveland, we feel that a buyer of metallic abrasives should be able to do just that.

The breakdown tester we use is shown herewith, and it's designed to separate the fact from the fiction.

After 100 passes through this tester, at 7200 r.p.m., we *know* how good our abrasives are and how long they will last.

This tester, combined with our other extensive laboratory equipment, is an integral part of our production control system.

All of it, of course, is working hard every day to give you top-quality, long-life, economical Metallic Abrasives . . . based on fact.

There are more details in our catalog, which is yours for the asking.

COMPARATIVE TEST REPORT

MATERIAL TESTED — S660 CHILLED IRON SHOT

A – Cleveland Metal Abrasive B – Competitors C – Competitors

SCREEN ANALYSIS

U.S. No.	S.A.E. Spec.	A	B	C
8	0	0	0	0
10		35.5	54.0	36.0
12	85	60.3	36.2	48.0
14	12	4.2	7.7	14.0
Pan	3	0	1.1	2.0

CHEMICAL ANALYSIS

	A	B	C
T.C.	2.72	3.29	2.42
Si	1.13	1.36	1.20
Ph	.056	.380	.130
Mn	.40	.36	.47
S	128	.176	.141

Rc HARDNESS

	A	B	C
Low	58	59	57
High	62	65	62
Average	60	63	59

BREAKDOWN TEST

Thru U.S. No. 10 on U.S. No. 12 — No. of Grams Tested—100 — 100 Passes at 7200 R.P.M.

	A	B	C
12	0	0	0
14	.2	0	.1
16	4	0	.5
18	4.8	.1	3.5
20	15.6	.2	9.4
25	24.4	7.9	20.7
30	13.5	8.4	12.1
35	9.9	10.6	11.5
40	4.1	11.3	6.0
45	2.7	7.1	4.6
50	2.0	14.2	3.4
Pan	13.7	27.6	17.8
Loss	8.7	12.6	10.4

Remarks — C.M.A. material best by test. *B. M.*

CLEVELAND ABRASIVES

1. Realsteel Shot and Grit 2. Pearlitic Malleable 3. Normalized
4. "A" Iron 5. Hi-Strength "B" 6. Chilled Iron 7. Drawn Steel

World's Largest Producer of Metallic Abrasives

CLEVELAND *metal abrasive co.*

General Office: 888 East 67th Street • Cleveland 8, Ohio

Plants at: Howell, Michigan; Toledo; Cleveland; Northfield, Ohio

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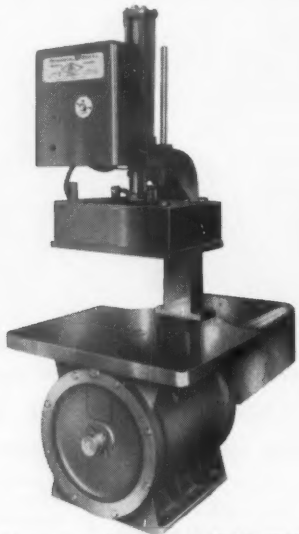
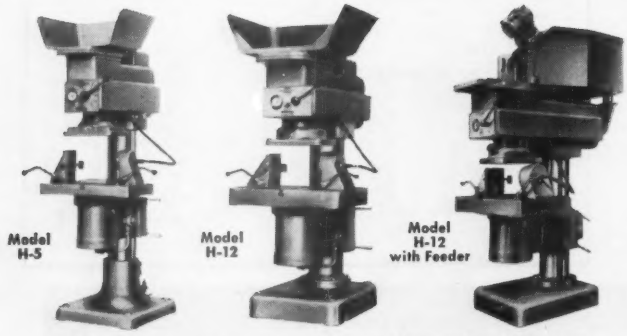
THREE IMPORTANT ANNOUNCEMENTS FROM

HANSBERG *Shooters* INC.®



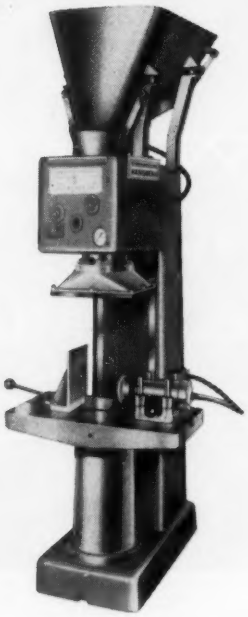
No. 1 The New Revolutionary H-33 "VACUUM GASSER"

The new H-33 "Vacuum Gasser" is fully automatic, push button controlled. Needs no vacuum pump, no rigging or venting of core box. CO_2 Gas penetrates completely momentarily to all sections, into all pockets as well as edges. No soft spots in cores or molds. No waste of gas, it's faster and saves at least 75% CO_2.



No. 3 New Economy Type HANSBERG SHOOTERS

Good news for the thrifty foundrymen: now available the most successful core making machines, true Hansberg SHOOTERS, simplified design, no moving parts, no sand blasting, the most ideal machine for the CO_2 process since no mixing of compressed air and sand as in sand blasting machines, saves CO_2 binder, thus avoids overloading of sand with soda, no driven agitators or pulsators or any other trouble causing gadgets required, stationary sand reservoir, RAPID CHANGE OF CORE BOXES, quick interchangeable shoot heads, heaviest sands with high moisture content possible, lowest maintenance machine, THE MOST FOR YOUR FOUNDRY DOLLAR.



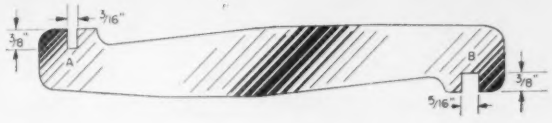
No. 2 Fully Automatic HANSBERG CORE SHOOTER Model H-5A with the NEW vibratory Sand Feeder

Fully automatic, push button controlled, synchronized with exclusive automatic SAND CHARGER, new improved VIBRATORY FEEDER, feeds exact amount of sand, actuated by a patented device inside sand reservoir. Quick interchangeable shoot heads, RAPID CHANGE OF CORE BOXES, adjustable table height hydraulically operated, telescoping cylinders ground to closest tolerances allow wide range of clamping and drawing of core boxes, sand reservoir stationary can not get out of line with the table as in old fashiond core blowing machines with movable sand reservoir. No agitators as in sand blasting core blowers — HEAVIEST SANDS POSSIBLE, the ideal machine for CO_2 sands since no partial precuring of CO_2 mix in the machine as in blowers. SAFETY FEATURES prevent shooting unless machine is filled with sand.

HANSBERG *Shooters* INC.®

3213 CENTRAL STREET EVANSTON, ILL., U.S.A.

HOW TO DO IT



Bending Tool Eases the Job of Fabricating Arbors for Cores

By H. M. GRIFFOUL
San Jose, Calif.

IRON BENDER for hand forming mild steel squares, flats, or rounds into core arbors is made from an old, flat file. As shown in the drawing, a 3/16-in. notch is cut in one end of the tool and a 5/16-in. notch in the other end. These notches will accommodate stock in varying thicknesses from 1/8 to 5/16 in., permitting a coremaker to fabricate arbors in a variety of shapes.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

coreroom. From my first over-all look, I didn't see any world-shaking innovations. Everything seemed to be conventional, including considerable handwork, and in spite of the presence of core blowers.

"I know what your thinking—handwork with idle blowers," my guide said, not the least bit apologetically, "but we have found that with our type of work, a broad band separates legitimate handwork from machine work, not a sharp line, as we used to think. When blowing became standard procedure, our costs in that borderline band got clear out of hand. There still are a lot of tricks up the old-fashioned coremakers' sleeves," he went on to say. I automatically nodded my head as I considered the top-notch cores I saw on every hand.

One little gimmick struck my fancy—a little gigger-bob, with a vibrator and corebox-guiding lift arrangement and an air cylinder to help in certain cases. Everything was adjustable for boxes from peewee sizes to king-sized. I'm going to rig me up something on that order for the Lee Hobby Foundry. Our coremaker, Ralph Lee, is getting along in years and isn't as steady as he used to be on those high-lift, low-draft boxes.

It would take several columns of "Man To Man" to tell you about every interesting thing I saw, but I have to mention this one.

As we were heading for the office from our trip, one of the foremen waylaid my host and pointed to a good-sized mold that had just been poured. He proceeded to dunk a skimmer or something into a still molten riser and then clunk it onto the solid pouring basin. "That's that sample of hot-top gunk we got. Remember?" he asked.

I had to think that it would have taken quite a presentation with colored charts and persuasive talk to make the same impression the silent foreman made in less than a minute with his skimmer. I'm going to get me some of that stuff. I knew about it before, but now I have seen it in action. What a difference!

There's no moral in this gossip about my visit to this splendid foundry. But even through the eyes of an amateur, and even in times like these, it seems that without pulling rabbits out of hats, a foundry can do right smartly for itself in holding a high standard for all of the everyday chores that go to make up this interesting craft of ours. There's a darned good feeling in this foundry too. I saw it in the face of practically everyone I met in the plant.

Annual AFS Competition for Apprentices Gets Under Way

The Robert E. Kennedy Memorial Apprentice Contest sponsored by the American Foundrymen's Society opened Oct. 1 and closes March 16, 1959. The contest has been held annually since 1924.

Any apprentice, learner, or trainee in the metal castings industry who has not had more than five years patternmaking experience, nor more than four years molding experience, is eligible. AFS membership by either the contestant or his employing company is not required. Also, the amount of apprentice training or other training has no bearing on eligibility and is not considered in the judging.

Cash prizes of $100 for first place, $75 for second place, and $50 for third place will be awarded winners in these contest divisions: Gray iron molding, nonferrous molding, steel molding, metal patternmaking, and wood patternmaking. Certificates of recognition also will be presented to winners. First and second place winners in each division will be invited, and round-trip travel expense paid, to attend the society's annual convention in Chicago April 13-17.

A copy of the official rules and regulations and additional information may be obtained from R. E. Betterley, educational director of the society, Golf & Wolf Roads., Des Plaines, Ill.

Book Review

Coated Abrasives—Modern Tool of Industry, 452 pages, 6 x 9 in., published by McGraw-Hill Book Co., 330 West 42nd St., New York 36.

Sponsored by the Coated Abrasives Manufacturers' Institute, the volume contains extensive information on the manufacture of various types of abrasives, their economic advantages, and efficient methods of use. Applications ranging from heavy material removal to fine polishing are covered. Recent advances in the field are discussed, including new automatic machinery, strip scouring applications, pre-plate and contour finishing, and such special topics as cutting oils, coolants, and lubricants, specifically for use with coated abrasives.

Material is aimed toward helping manufacturers decide what plant operations may be done better with coated abrasives, and provides specific methods showing how to achieve the most efficient and economical results in their use.

Speaker's table at annual banquet held during fall meeting of the SFSA

STEEL FOUNDERS' SOCIETY

Holds 56th Fall Meeting

By **WILLIAM G. GUDE**
Managing Editor

MANAGEMENT subjects occupied the attention of steel foundrymen at the 56th fall meeting of the Steel Founders' Society of America. The meeting was held at the Homestead, Hot Springs, Va., Sept. 22-23.

Society president Ross L. Gilmore, president, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., presided at the opening session and spoke briefly on various of the society's activities. These included work of the relatively new Management Accounting Program Committee, the Technical Research Committee, and the Technical and Operating Committee. The last group, he reported, has arranged an excellent program for its annual conference to be held at Cleveland, Nov. 10-12.

The Product and Market Development Committee is pushing its program and has started a series of conferences on the subject.

One of the latest research projects sponsored by the Technical Research Committee investigated the effect of heat treatment variables on steel toughness. It is expected to offer opportunities for savings in heat treatment costs.

Chauncey Belknap of Patterson, Belknap & Webb, New York, discussed certain tax aspects of the Steel Foundry Research Foundation.

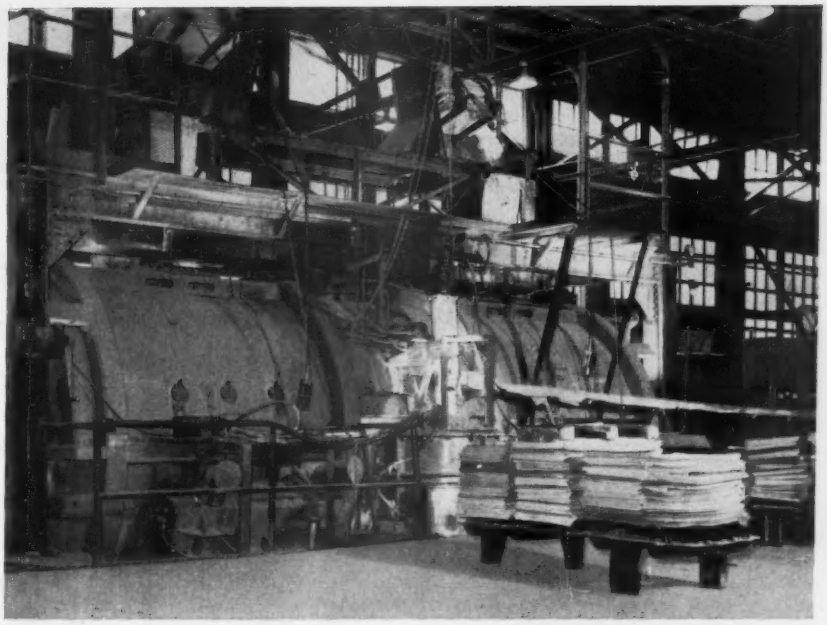
"Are You Sitting on Your Ideas?" was the title of a thought-provoking talk by Dr. G. Herbert True, vice president, creative planning, Institute of Visual Research Inc., South Bend, Ind. Pointing to the dangers that can threaten a business when it refuses to break with tradition by discouraging new ideas, the speaker made a plea for creative thinking. Too much emphasis, he said, is placed on the extent to which an individual's capabilities are affected by his age, formal education, IQ, experience, and health.

A safety film entitled "Knowing's Not Enough" started off the second day's program. Produced originally for United States Steel Corp., the film is based on the fact that awareness of accident hazards alone will not prevent injuries; in most accidents caused by carelessness, the injured man knew better. A way is suggested by which workers can be induced to act safely, based on their knowledge of unsafe practices. Howard Mason, vice president, Symington Wayne Corp., Depew, N. Y., told how his company developed a safety program built around the theme of this movie.

A new society booklet, "Sinews

Principal speakers at business sessions of the meeting, shown top to bottom, were Joseph Pelej, Price Waterhouse & Co.; SFSA President Ross L. Gilmore, Superior Steel & Malleable Castings Co.; Marion J. Allen, American Steel Foundries; John M. Marston, Ball, Burge & Kraus; and Dr. G. Herbert True, Institute of Visual Research Inc.

Birthplace of an Automotive Part



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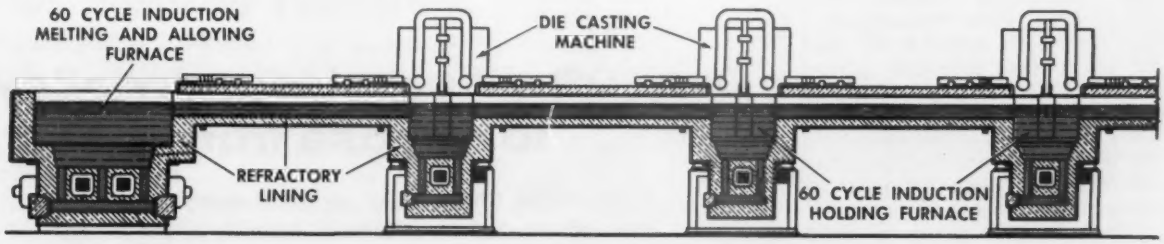
High in the mountains of Idaho, the AJAX-TAMA-WYATT 800 kw induction furnace melts 235 tons of electrolytic zinc cathodes day after day. THE BUNKER HILL COMPANY, originators of Special High Grade Zinc, take pride in the purity (99.99+% Zn) of the slab poured from this 60 CYCLE INDUCTION MELTING unit. Such pure metal insures the soundness of the many zinc die castings used in our cars and appliances.

To maintain this purity when remelting the slab for die casting, hundreds of AJAX-TAMA-WYATT furnaces are used today in our busy industrial regions. The diagram below shows a modern zinc die casting line for automotive parts, using a central 60 CYCLE INDUCTION MELTING and alloying furnace, and holding furnaces at each machine. Connecting electric molten metal runways eliminate all metal transfer labor. Unexcelled metal quality, low metal losses, reliability and economy of operation are assured by using 60 CYCLE INDUCTION MELTING throughout.


60 CYCLE INDUCTION MELTING AND ALLOYING FURNACE
DIE CASTING MACHINE
REFRACTORY LINING
60 CYCLE INDUCTION HOLDING FURNACE

AJAX USA

ENGINEERING CORPORATION

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60 CYCLE INDUCTION MELTING

Associated Companies: Ajax Electrothermic Corporation Ajax Electric Company

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of Modern Living," is in course of preparation by the Advertising and Public Relations Committee, and will be available early next year, it was reported by the committee chairman, Marion J. Allen, American Steel Foundries, Chicago. Replacing a similar industry booklet published in 1949, it is intended to help generate interest among consumers in use of steel castings.

The steel castings industry offers moderately favorable opportunities for the investor's dollar, according to John M. Marston, partner, Ball, Burge & Kraus, Cleveland. He pointed out that because steel foundries are dependent on the prosperity of consuming industries, their business is subject to wide swings. The erratic buying practices of the railroads, a major consumer, have been a factor in these variations, and the outlook in this market is not promising.

Long-term prospects in rolling mill equipment are bright but not for the immediate future. Casting requirements for road building and farm implements appear good, and the outlook for a strong upturn next year in capital goods expenditures is favorable. The speaker also believes the business potential in the aircraft industry is growing.

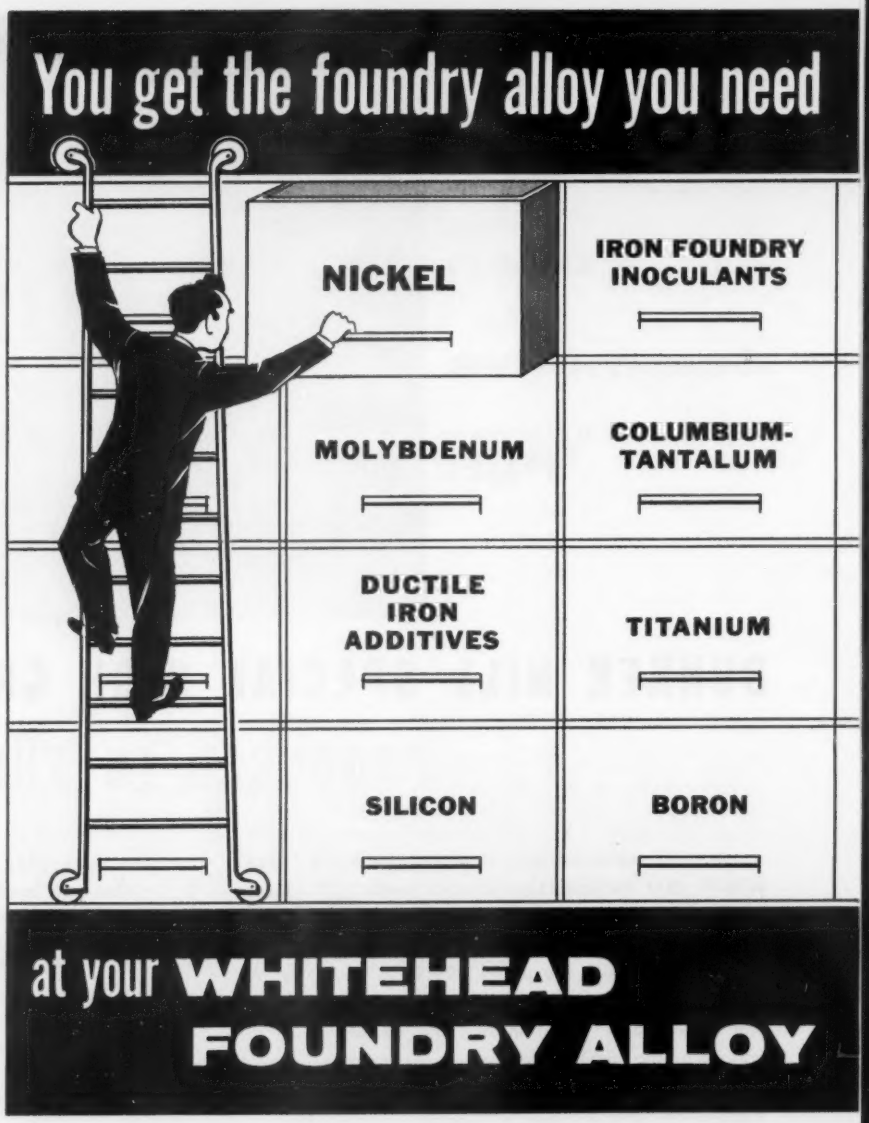
Capacity Is Adequate

Steel foundry capacity is adequate; no large capital investment is needed, and the industry is in good shape physically and financially. Mr. Marston indicated that from the standpoints of growth and return on investment, steel foundries must be ranked well below a number of other leading basic industries, including such fields as chemical and petroleum products.

"An Approach to Management Cost Accounting Control," by Joseph Pelej, Price Waterhouse & Co., New York, outlined the need for sound basic principles in cost determination. Many companies selling below cost, he said, don't know their costs; at the same time, the information provided by a cost control system is valueless unless intelligent use is made of it.

Under sponsorship of the SFSA Management Accounting Program Committee, Price Waterhouse & Co. are making a study of costing methods in the steel foundry industry, preparatory to drawing up a program intended to bring the industry's practices up to date.

It was announced that the 1959 annual meeting of the Steel Founders' Society has been scheduled for March 9-10 at the Drake Hotel, Chicago.



Over 99 different foundry alloys to choose from

Nickel, Silicon, Chromium, or any one of more than 96 other alloys off-the-shelf – you name it! Virtually all the foundry alloys you could possibly use are at your nearest Whitehead warehouse. You can get handfuls to carloads in the standard sizes and forms you prefer. You'll find the price is right, too!

These foundry alloys are all the quality products of such leaders in industry as The International Nickel Co., Vanadium Corporation of America, and Shieldalloy Corporation.

So, why not check your supply of foundry alloys? If your stocks are low, get what you need, off-the-shelf, from Whitehead.

"Off-the-Shelf"

SILICO-MANGANESE	TUNGSTEN	ZIRCONIUM
MELTING BASE ALLOY	VANADIUM	COLUMBIUM-CHROMIUM
MANGANESE	COLUMBIUM	VANADIUM-ALUMINUM
CHROMIUM	MOLYBDENUM-CHROME	CHROMIUM-TUNGSTEN

"Supermarket"

Plus Items for Foundries:

Welding Rod – Whitehead Metal "Supermarkets" maintain full stocks of a wide range of welding and brazing supplies. Two of the most popular items are Ni-Rod and Ni-Rod "55" Electrodes which many foundries use in salvaging castings with defects, for repairing heavy sections and joining dissimilar metals. Check your Whitehead man for detailed information.

Aluminum Core Plate – Strong, light-weight, easy to use. Good long-lasting flat core plate available "off-the-shelf" from Whitehead.

Fasteners, too – Screws, bolts, washers, etc., in the quality alloys.

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Circle 626 on Page 51

Two AFS T&RI Courses Cover Industrial Engineering Field

The Training & Research Institute of the American Foundrymen's Society will complete its 1958 program by offering two industrial engineering courses, one in Chicago, the other in Milwaukee.

A course entitled "IE2A—Foundry Plant Layout" will be given Nov. 10-12 at the Hamilton Hotel, Chicago. It is a three-day training session on important problems confronting foundry management contemplating new plants, remodeling of existing facilities, or modernization and mechanization of established operations. The course emphasizes reduction of costs through efficient use of space, economical movement of material in the plant, and improved use of manpower and equipment.

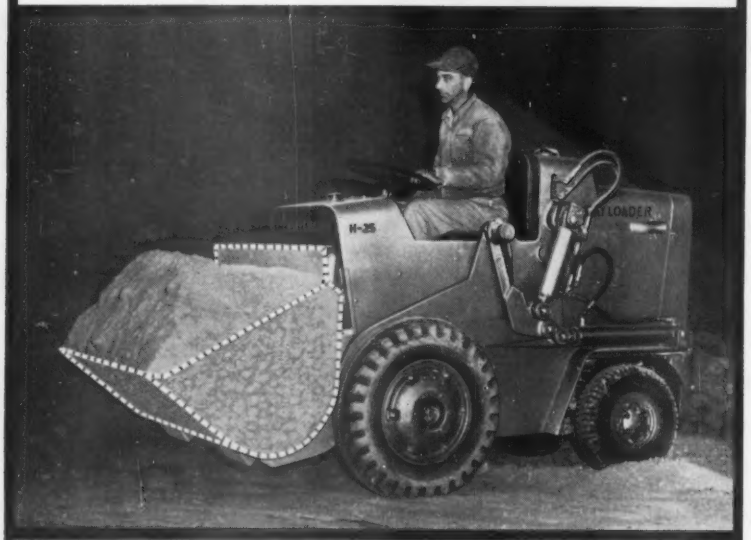
Foundry plant layout will be studied from three major points of view: 1. Over-all physical plant (site, transportation, floor area, type of operation, etc.). 2. Departments as service areas for castings production (coreroom, pattern shop, cleaning room, melting department, etc.). 3. Individual work stations or operations.

Main topics to be covered in the course outline will include the following: 1. Fundamentals and considerations. 2. Physical plant. 3. Material handling. 4. Production sequence. 5. Equipment. 6. Safety and hygiene. 7. Plant layout step procedure. Lectures and discussion periods will be led by competent and recognized authorities in the respective subject matter areas. The $40 tuition fee includes luncheons, books, and instructional material.

"New Industrial Engineering Techniques in the Foundry" is a course organized primarily for personnel with some experience in basic motion time-study practices. It is a practical course designed to guide industrial engineers in methods and techniques for applying cost-reduction principles and quality control to foundry operations. Its main objective is to provide practical tools for greater profit. The course is listed as "IE3A-Industrial Engineering (Advanced)" in AFS literature and is being cosponsored by T&RI and Marquette Management Center, Marquette University, Milwaukee. It will be held Dec. 8-12 at the Management Center, 606 N. 13th St., Milwaukee.

The classroom schedule will con-

It's not bucket SIZE...



It's the weight of the load that determines capacity

BUYING A TRACTOR-SHOVEL on a *bucket volume* basis, without knowing the unit's carry capacity in pounds puts the cart before the horse . . . you may get too much bucket (or not enough) to handle *your* material most efficiently.

Buying on the basis of *lifting capacity* is equally misleading since any unit can lift much more than it can carry. It's the pounds that can be moved safely at normal speeds, in relation to the weight of the material to be handled that determines proper bucket size.

MORE POUNDS PER LOAD—the *2500-lb. carry capacity* rating of the new model H-25 "PAYLOADER" is equal to 40% of the total machine weight. It represents *a new high* in capacity-to-weight ratio for tractor-shovels of this class.

MORE LOADS PER SHIFT— not only does the H-25 handle a bigger load for its size and weight, but it has the speed, maneuverability and ease of operation to move more loads per shift. These features make this *extra production* possible: 2-speed, full reversing power shift transmission with matching torque converter, power steer, power transfer differential, closed hydraulic system, triple air cleaners, major pivot points sealed and 40° bucket tip back.

It will pay you to have a Hough Distributor demonstrate how the H-25 "PAYLOADER" can handle more tonnage at lower cost. Ask about Hough Purchase and Lease Plans too.

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sist of lectures, demonstrations, discussion periods and problem-solving sessions. Subject matter will include "Work Sampling," "More Accurate Rating of Time Studies; Cutting the Errors in Half," "Statistical Quality Control," and "Using Motion Pictures in the Foundry for Industrial Engineering." Instructors will bring to the sessions a wealth of material developed by practical experience in industrial engineering and foundry operation. The $125 tuition fee includes luncheons, books, and instructional materials.

For additional information and course registration, contact the Training and Research Institute Director, American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill. Registration can be made immediately by sending the name of registrant, his title and company and enclosing the tuition fee for courses desired.

Book Review

Cores and Coremaking, by Francis D. Roper, cloth, 126 pages, published by George Allen & Unwin Ltd., 40 Museum St., London, W.C. 1, England. Price 21s.

Written with the craft apprentice and foundry student in mind, this book is concerned not only with the basic principles of coremaking but also with the various steps of the operation. These steps range from sand mixing to core drying, dressing, and assembling. Core blowing, shell cores, and the CO_2 process are discussed briefly.

Somewhat surprising is the inclusion of horse manure as one of the ingredients listed for "typical" mixtures for dry-sand cores used in the production of iron castings.

Taylor Zircon Prolongs Ladle Life...

produces cleaner metal too

Taylor Zircon No. 717 Ramming Mix is a most effective lining for ladles handling various types of iron and steel. A St. Louis foundry uses No. 717 exclusively for receiving and pouring ladles in their stainless steel and high alloy operations. They call it the best lining material they have ever used, because:

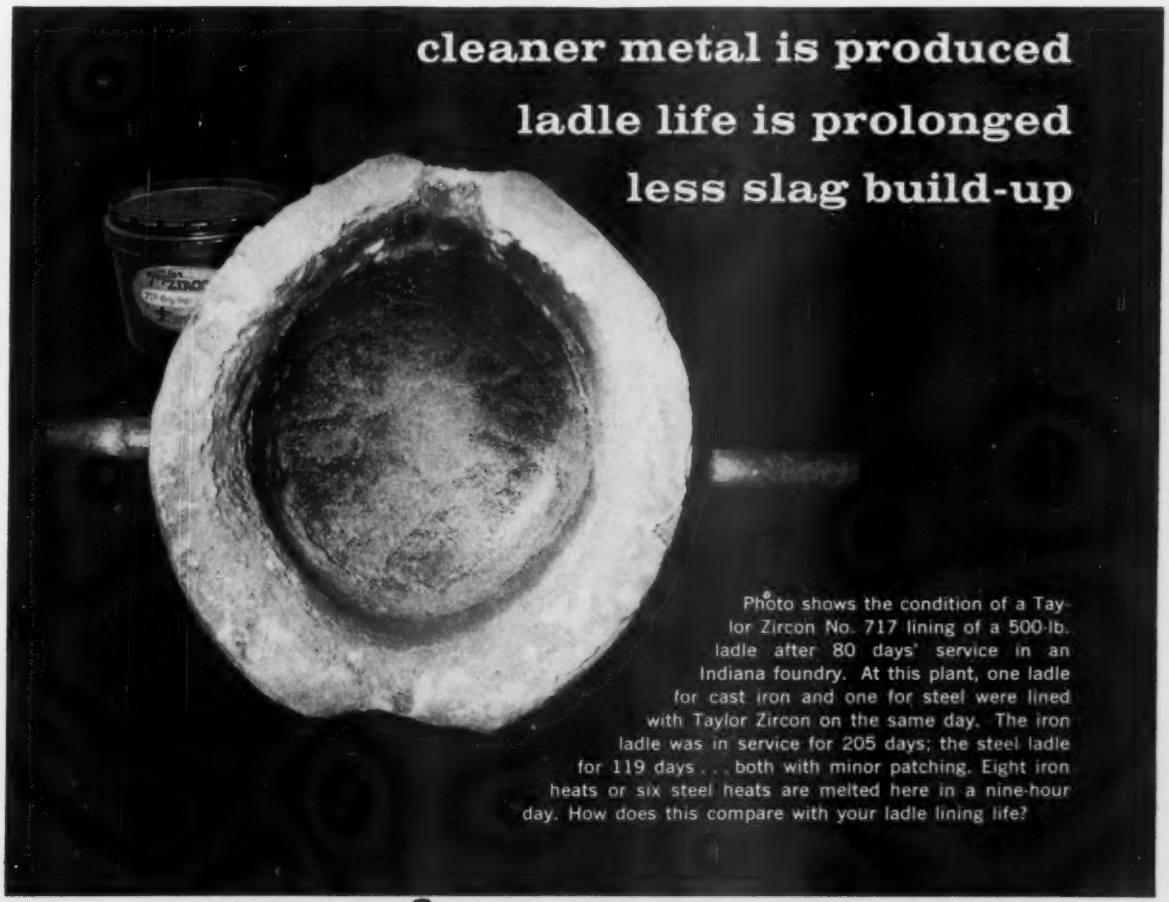

Photo shows the condition of a Taylor Zircon No. 717 lining of a 500-lb. ladle after 80 days' service in an Indiana foundry. At this plant, one ladle for cast iron and one for steel were lined with Taylor Zircon on the same day. The iron ladle was in service for 205 days; the steel ladle for 119 days . . . both with minor patching. Eight iron heats or six steel heats are melted here in a nine-hour day. How does this compare with your ladle lining life?

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Circle 628 on Page 51

Members of the old and new board of directors at the annual meeting of the Gray Iron Founders' Society held in Washington, Oct. 8-10

Industry's Future Studied at

GRAY IRON FOUNDERS' MEETING

By FRANK G. STEINEBACH
Editor

MEMBERS of the Gray Iron Founders' Society, at the 30th annual meeting, reviewed activities during the past year, discussed the economics of melting equipment, heard a report on the challenge of a competing material, and probed general problems affecting the industry. The meeting was held at the Sheraton-Park Hotel, Washington, Oct. 8-10.

Albert M. Nutter, treasurer, E. L. LeBaron Foundry Co., Brockton, Mass., was elected president of the society, succeeding J. Scott Parrish Jr., president, Richmond Foundry & Mfg. Co., Richmond, Va. Mr. Parrish will continue on the board in an advisory capacity.

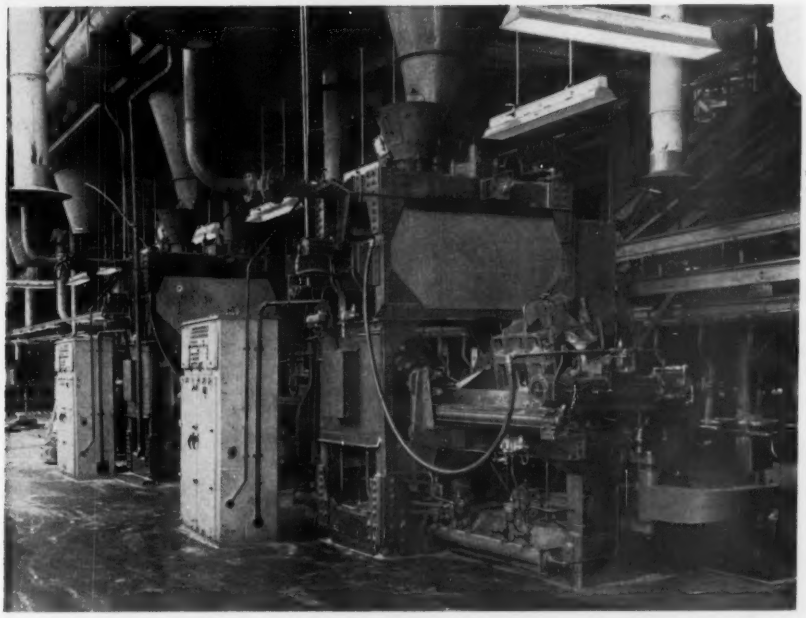
Other officers elected were J. E. Quest, president, Quest Mfg. Co., Shakopee, Minn., vice president; and William A. Hepburn, vice president and treasurer, John T. Hepburn Ltd., Toronto, secretary. C. R. Garland, secretary and comptroller, W. O. Larson Foundry Co., Grafton, Ohio, was re-elected treasurer.

New directors named for a three-year term are: J. T. Boyd, superintendent, Goldens' Foundry & Machine Co., Columbus, Ga.; W. G. Greenlee, president, Greenlee Foundry Co., Division of Greenlee Foundries Inc., Chicago; C. R. Gregg, president, Gregg Iron Foundry, El Monte, Calif.; and A. B. Sayre, president and treasurer, American Abrasive Metals Co., Irvington, N. J. Donald H. Workman was reappointed executive vice president.

GIFS Awards—Henry J. Trenkamp, formerly president, Ohio Foundry Co., Cleveland, and now associated with Taylor & Boggis Foundry, a Division of Consolidated Iron-Steel Mfg. Co., Cleveland, was presented the society's Gold Medal. Mr. Trenkamp received the honor for his valuable and unselfish contributions to the welfare of the society and the gray iron foundry industry as chairman of the Budget and Finance Committee, member

Henry J. Trenkamp, at right, is awarded the society's Gold Medal by Walter L. Seelbach

FORD ENGLAND



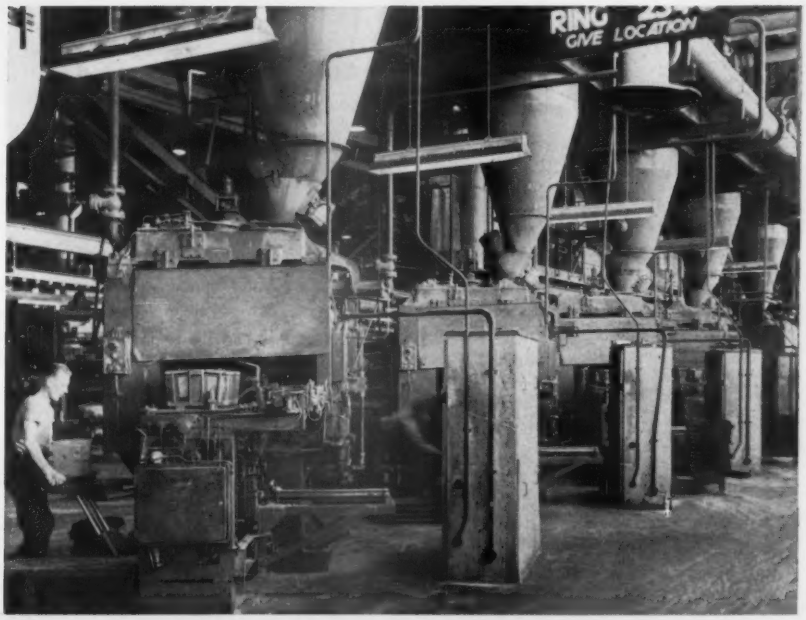
F.E. can equip your new Foundry or improve your present set-up with modern mechanization—Consult us for free!

Ford's new American style Thames Foundry at Dagenham, England incorporates a whole lot of F.E. equipment including two 200 tons per hour sand distribution and spillage systems.

Illustrated at left are the No. 300 Twin Station Automatic Coreblowers (4 supplied) for cylinder barrel cores. No. 300 incorporates central combined blow, and high pressure squeeze with automatic four-way draw on each rollover stripping station, for high production of deep complicated cores to 125 lbs. each.

Illustrated right are the No. 220/530 Single Station Automatic "Package Units" (5 supplied) for simpler cores at super speeds (up to 240 cycles per hour with one man)

15 other Core Rollover Strippers also supplied.



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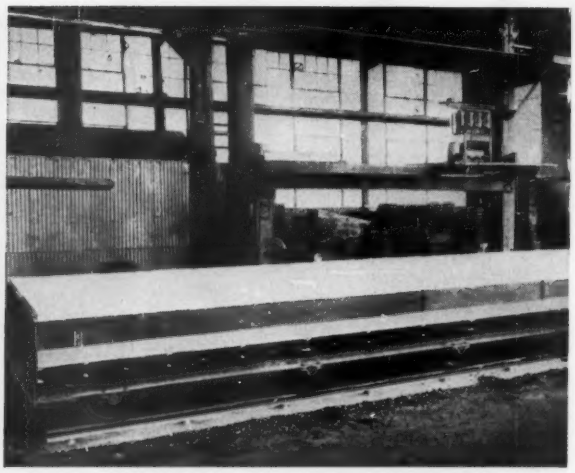
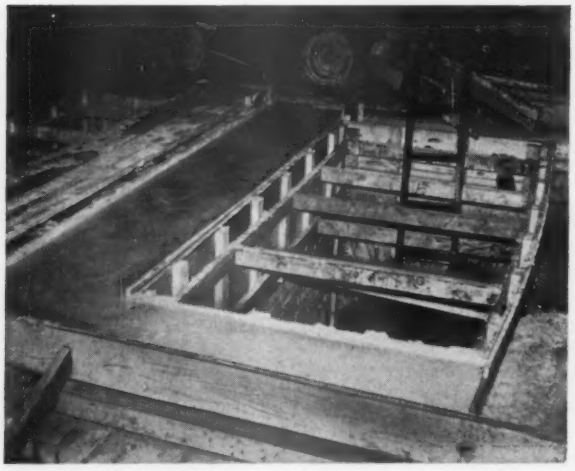
Circle 629 on Page 51

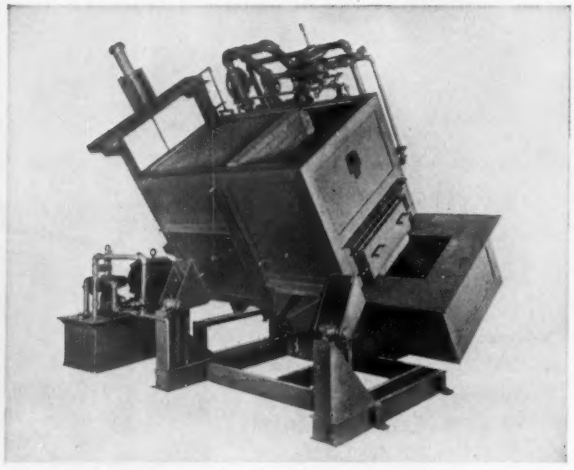
In this stress-relieving furnace, B&W Kaocrete-D is used on the floor ledges, car top, in the door jamb and at the end of the flat roof where it withstands the abrasion of the door. This material is specially designed to withstand severe abrasive conditions and mechanical abuse.



Heavy duty car top service requires a high strength castable. B&W Kaocrete-D is excellently suited for this service at temperatures to 2500 F. B&W Kaocrete-32 is recommended for service above this range.



B&W Kaocrete-32 has been cast to form the curb walls of a soaking pit. When mechanical abuse from ingots damages the curb, Kaocrete-32 has the necessary properties to localize the damage, thus maintaining the serviceability of the rest of the curb.



The castable lining of this aluminum reverberatory furnace must have unusually high strength to withstand the considerable physical abuse of charging, operating and cleaning, while resisting the penetration of the molten metal. Kaocrete-D is widely used in this application.

How B&W refractory castables solve abrasion problems

Refractory castable linings used in metal-working furnaces are often subjected to severe mechanical abuse. Scraping by hand tools, loading and unloading, and the action of the molten metal and particle-laden gases all affect the life of refractories. Among B&W's line of refractory castables are two that are particularly suited to withstand unusual abrasive conditions. They are B&W Kaocrete-D and B&W Kaocrete-32, both of which have been used successfully in many demanding applications.

Send for a copy of B&W Bulletin R-35A. It gives additional information on versatile B&W refractory castables.

R606

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars B&W Silicon Carbide • B&W Ramming Mixes • B&W Kaowool

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of the board of directors, treasurer, and president in 1952-54.

Also honored were J. Scott Parrish Jr., retiring president of the society (1956-58), and A. H. Renfrow, partner - general manager, Renfrow Foundry, Los Angeles, for unusual and outstanding service to the society and the gray iron foundry industry.

Society Activities—Reports of activities of the society were presented in an interesting and unusual way. With President J. Scott Parrish Jr. presiding, Donald H. Workman, executive vice president, Richard C. Meloy, marketing director, Charles F. Walton, technical director, William M. Caldwell, assistant secretary, and E. Harold Mitchell, field director, answered questions on what had been done and what was planned for the future.

Newly elected officers of the GIFS are, left to right, William A. Hepburn, secretary; Albert M. Nutter, president; J. E. Quest, vice president; C. R. Garland, right, was re-elected treasurer

Starting with the annual meeting at Chicago a year ago, it was pointed out the society has held 10 regional sales clinics which have been exceptionally well received, five regional meetings, 79 cost clinics, and 108 management meetings.

Plans are under way for a series of design conferences to tell engineers more about the products of the industry. These will be staged in various parts of the country, and in each case the members in the district will be briefed on the conference program the preceding day.

Over 7000 copies of the Gray Iron Castings Handbook have been distributed, but it is felt that more copies should be put in circulation by member companies. A "Gray Iron Castings Data File" was prepared recently for use by society members, and copies of it were distributed to those in attendance.

The society participated in the Design Show held in Chicago last May, with excellent results. It also operated a hospitality booth at the 1958 AFS Foundry Show in Cleveland. The society has presented much valuable information to its members through the "Gray Iron News." Also, business publications have presented considerable information on the industry and its product.

In speaking on "Helping Business Is Our Business," Horace B. McCoy, administrator, Business and Defense Services Administration, Department of Commerce, Washington, said that representatives of the Gray Iron Founders' Society and other ferrous foundry societies, have asked BDSA to provide a separate division for ferrous castings rather than have it a branch of the Iron and Steel Division. Mr. McCoy stated that in preparing plans for mobilization readiness, the BDSA has decided to put a Division for Ferrous Castings into its emergency organization.

E. J. Walsh, executive director, Foundry Educational Foundation, described how the foundation is taking the story of castings' potentials to thousands of engineering students on the campuses of FEF schools. Castings sales start with training the engineering student on the applications of cast parts, and this is being done through the FEF and the co-operation of other foundry organizations.

Ashley B. Sinnett, secretary, American Foundrymen's Society, reported an excellent response to the announcement of the Engineering Castings Show to be held in Chicago, April 13-17, in conjunction with the annual AFS meeting. Mr. Sinnett predicted the utilization of all space available in the exhibit hall of the Sherman Hotel.

The Aluminum Engine — The program which attracted most attention from GIFS members and the business and general press was a presentation on "Implications of the Aluminum Automobile Engine," by Darl F. Caris, engineer in charge of power development group, engineering staff, and Dr. Robert F. Thomson, head of metallurgical engineering research staff, General Motors Corp., Detroit. Their remarks are presented in detail in this issue, starting on Page 92.

Melting Equipment Symposium —Greater attention to the technical phases of gray iron foundry operation was provided at the meeting through a symposium on "An Economic Evaluation of Melting Equipment." Charles F. Walton was moderator.

J. Douglas James, vice president, Urick Foundry Co., Erie, Pa., reviewed the conventional cupola, pointing out that today such cupolas are producing class 20 to class 50 irons with ductile iron on a production basis during the same day's melt.

Figures from a cost group of GIFS covering 15 to 20 foundries over a six-month period show the following costs per pound of castings produced: Pig and metal, $0.0307; coke 0.0043; labor and foremen, 0.0036; supplies, 0.0018; repairs, 0.0004; and overhead, 0.0048. Total cost per pound of good castings was 0.0456. Average total cost per pound, f.o.b. foundry, of good castings produced, including molding, cores, cleaning, shipping, etc., was 0.1624 per pound. The total cost of metal plus conversion represents 28 per cent of the total cost of good castings produced. Metals and coke account for 21½ per cent of cost and conversion 6½ per cent.

Mr. James believes that the conventional cupola will be with us for some time. Its simple construction and operation lends itself to adoption by all conventional foundries. Plenty of economies can be obtained by its proper use, and in most cases simply by replacing the "brawn" charged with responsibility of operating the cupola with some "brains."

A paper by Hal Ruf, Grede Foundries Inc., Milwaukee, and presented by Mr. Walton, described a basic-lined cupola operated by his company. It is lined with basic brick and patched with a calcined

J. Scott Parrish Jr., left, and A. H. Renfrow, right, are presented scrolls by Walter L. Seelbach for service to the society and industry

dolomite. The basicity ratio is 2.6.

Using 900 lb steel, 700 lb ductile iron returns and lump 50 per cent ferrosilicon, the composition of iron at the tap is 3.9 total carbon, 1.3 silicon, 0.45 manganese, 0.025 sulfur and 0.025 phosphorus. Using 225 lb of coke provides a 7 to 1 melting ratio. Temperature of the metal at the tap consistently is over 2800° F. Economy depends on the price of steel melting stock. The company feels that this type of equipment provides the best way to produce ductile iron of consistent quality.

Walter O. Larson Jr., president, W. O. Larson Foundry Co., Grafton, Ohio, discussed a series of steps taken to provide his cupola with water cooling and hot blast. The cupola now has a water-cooled shell with internal cooling tubes, water-cooled protruding tuyeres, and a fintube type hot blast.

Total capital expenditure for the changeover was $60,100. The water-cooled shell has increased the tonnage which can be melted by the unit, and the water-cooled tuyeres have reduced the cfm by 10 per cent and the coke bed by 10 per cent. Cost of the metallic charge has been reduced and greater efficiency has been provided. The hot blast has resulted in savings of $12 a day in the coke bed, $15 a day in patching cost, or a net savings of $6.30 a ton on melted iron. The savings have resulted in returning the original investment in 17 months. Mr. Larson pointed out that the unit easily can be changed over to the melting of ductile iron.

A paper by E. L. Roth, president, Motor Castings Co., Milwaukee, described a dry-blast cupola installation. Mr. Roth said that one of the biggest problems his company had encountered in producing 50,000 and 60,000 psi tensile iron was to make various sized castings with uniformly good machinability and minimum porosity. At times castings were hard and unmachinable, although their chemical analysis was identical with those of previous heats which had excellent machinability.

Dry Blast Offers Advantages

One day a customer asked, "Why is it that we have practically no trouble with your castings in the winter, but we get hard and porous castings in summer?" A study convinced the company that the variable water content of the air (humidity) was the cause.

The company then installed a dry blast on the cupola.

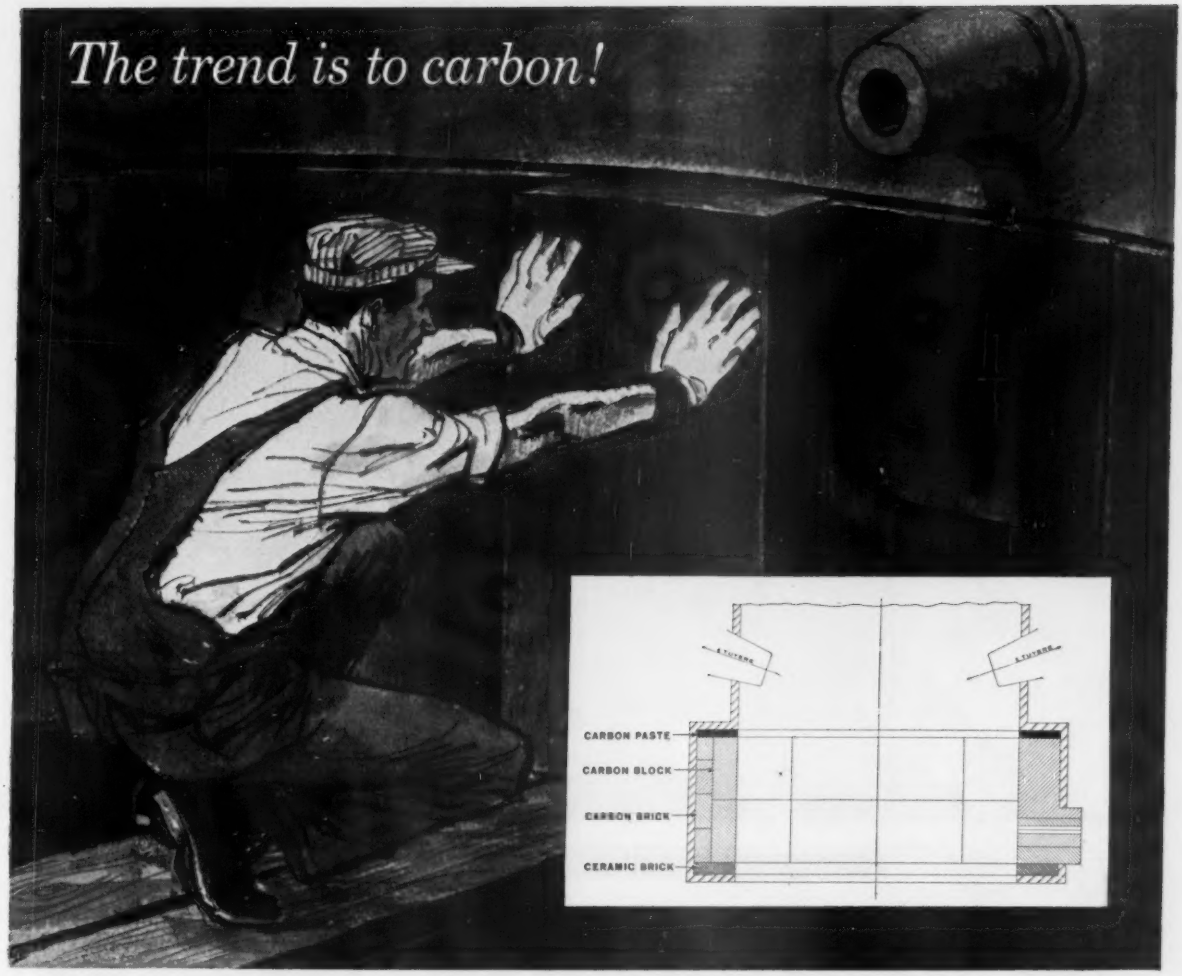
Mr. Roth reported the total cost of the installation was $31,500, including $7000 for the building which houses it. Rejections on critical castings of the class 50 and class 60 irons due to poor machinability and porosity decreased immediately. The same thing happened to a lesser degree on other irons produced by the company. Operating and maintenance costs on the dry blast are low and are more than offset by the savings in coke.

In the concluding discussion, J. H. Culling, vice president operations, Carondelet Foundry Co., St. Louis, considered the economic evaluation of electric melting equipment in a jobbing foundry. Mr. Culling listed the following energy costs per ton of gray iron melted in jobbing foundries in the St. Louis area: Indirect arc, $10.10; direct arc, acid lining, $9.90; direct arc, basic lining, $10.48; high-frequency induction, $10.76; line-frequency cored induction, $9.80; line-frequency coreless induction, $10.40; 180 - cycle - per - second induction, $10.84. The speaker indicated that these figures should not be taken as optimum. In summary, Mr. Culling stated that the direct-arc furnace combines the features of lowest lining cost, potentially lower power consumption, poorest chemical control of electric furnace types, and a vast array of sizes.

The indirect-arc furnace, according to Mr. Culling, is characterized by lowest installation cost per ton of all electric furnaces, rather good chemical control, energy consumption about equal to that of smaller direct-arc furnaces, and difficult and expensive lining maintenance with moderate mechanical maintenance.

Mr. Culling feels that the high-frequency induction furnaces are the most expensive to install of all electric furnace types. Chemical controls, alloy recovery, and uniformity of metal are excellent. Refractory costs are high, being about $4.78 per ton. Energy consumption runs high because of high radiation losses from the top and high conduction losses through the thin lining to the cooling coils.

Other speakers included Brig. Gen. Austin W. Betts, military executive assistant to the director of



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Due to its unusual and highly desirable physical characteristics, the trend today is to "National" carbon refractories for cupola construction. Its resistance to attack from either acid or basic slag, low co-efficient of thermal expansion, and high strength at elevated temperatures, make "National" carbon products an ideal material for lining cupola wells, tap holes and slagging troughs.

This material is available from stock in various sizes up to 24″ x 30″ x 108″ long and in standard brick shapes, ramming paste and carbonaceous cements. Fabricated furnace-liner sections and blocks, as illustrated, provide minimum joint construction. National Carbon Company has the facilities and experience to machine close tolerance pieces to your specifications.

Wherever your foundry operations call for a refractory material – from light-off to casting – it will pay big dividends to specify "National" carbon and graphite products.

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Guided Missiles, Department of Defense, Washington; Anthony P. Alfino, assistant manager, Labor Relations and Legal Department, Chamber of Commerce of the United States, speaking on "Dealing with Union Power," and Walter A. Slowinski, partner, Baker, McKenzie & Hightower, Washington, talking on "Problems of Perpetuating the Closely Held Company."

Design Contest—Awards on the 1958 annual design contest were announced at the Friday luncheon.

First prize of $500 was won by Earl R. Zuehlke, hydraulics engineer, Black-Clawson Co., Middletown, Ohio. His winning entry was an inlet head and dirt collection box for a liquid cyclone.

Second place and a cash prize of $100 went to Richard Q. Rinehuls, design engineer, Automation Services Inc., Port Crane, N. Y., for a semiautomatic film cutter case.

Tied for third place in the contest were the following: K. Rudolph, design engineer, McCulloch Motors Corp., Los Angeles; Orville W. Hoffman, engineer, General Electric Co., San Jose, Calif.; A. G. Bellos, chief engineer, Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.; Ralph V. Morr, product engineer, New Idea Division, AVCO Mfg. Corp., Coldwater, Ohio; and William A. Williams, consulting engineer, Philadelphia.

Presentation was made by Elmer J. Tangerman, editor, *Product Engineering*, New York, chairman of the Judging Committee. Other members of the committee were William Seelbach, Forest City Foundries, Cleveland; Prof. Daniel K. Wright, Case Institute of Technology, Cleveland; Warren W. Brown, Superior Foundry Inc., Cleveland; M. H. Bechemer, W. O. Larson Foundry Co., Grafton, Ohio; and D. W. Evans, Towmotor Corp., Cleveland.

Management Group To Meet

Industrial Management Society will hold its 22nd annual Industrial Engineering and Management Clinic at Sherman Hotel, Chicago, Nov. 5-7. Experts from industry, labor, and education will discuss cost reduction techniques covering such subjects as work simplification, time study, incentives, motion economy, automation, plant layout, and material handling. Films from the society's annual competition for outstanding examples of on-the-job methods improvements in American industry will be shown.

precise heat for precision casting

You'd *expect* the accurate heat of an induction furnace to be an important consideration in permanent mold, shell mold, and investment casting . . . and it *is!* But in addition to precise temperature control, Ajax-Northrup high frequency induction furnaces provide the precision foundry with *flexibility*, *purity*, and *economy*. That's why Ajax leadership in melting for precision casting has never been challenged.

One furnace—hundreds of alloys: Ajax-Northrup furnaces can handle any one or all of the hundreds of ferrous and non-ferrous alloys being made today. For many alloys, it's the only furnace that *can* be used. Magnet alloys, for example, depend on the inherent stirring action which assures ideal dispersion of all elements throughout a melt . . . and the most uniform possible cast part analysis.

Pure metal protects part quality: There's no flame, no smoke, no physical contact between coil and metal. Melts are always 100% on analysis, because there's no chance of contamination . . . particularly important when you're dealing with the finicky alloys common in precision casting.

A better melt at a lower cost per melt: Because every melt is uniform and to exact composition, bad melts become a thing of the past. Subsequent machining is minimized. Ajax-Northrup's unique control system assures maximum melting efficiency—lower melting costs. And new, compact designs minimize floor space requirements, installation costs and maintenance.

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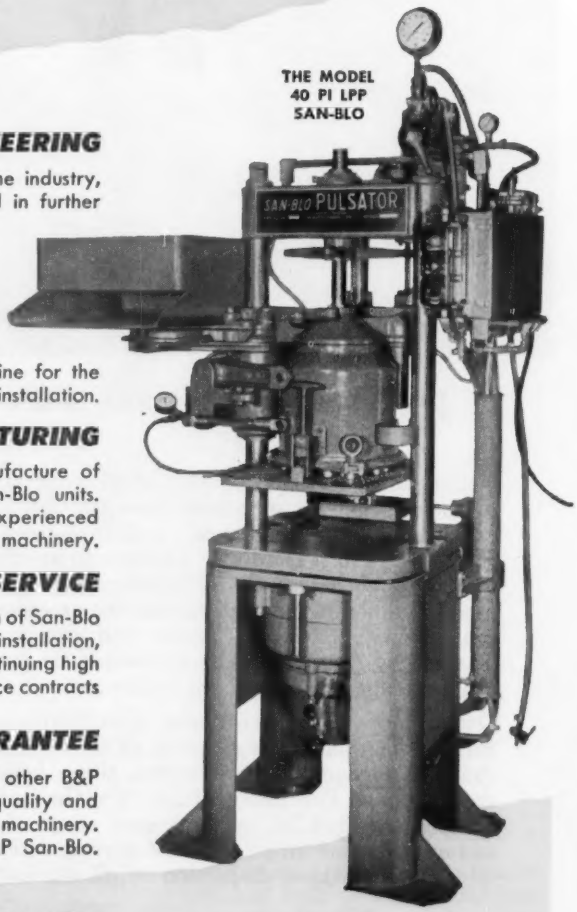
Available in every conceivable capacity from a few ounces to several tons . . . powered by massive motor-generator sets or economical converters . . . there's an Ajax-Northrup induction furnace sure to satisfy your needs perfectly. We'll gladly send you further information or, if you wish, arrange a meeting with qualified furnace engineers to discuss your special requirements. Ajax Electrothermic Corporation, Ajax Park, Trenton 5, New Jersey.

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY-AJAX ENGINEERING CORPORATION

Circle 653 on Page 51

NOW SAN-BLO IS BACKED BY B&P

All SAN-BLO machines are now manufactured, sold and serviced by Beardsley & Piper. To B&P, this addition completes by far the largest selection of machinery of any manufacturer to meet every core room need. For present and future San-Blo customers, this change means that the well-known San-Blo machines are now backed by the world's largest manufacturer of foundry machinery.



THE MODEL 40 PI LPP SAN-BLO

BACKED BY B&P ENGINEERING

B&P maintains by far the largest engineering department in the industry, and the facilities of this department will now be fully utilized in further development and improvement of San-Blo machines.

BACKED BY B&P EXPERIENCE

The B&P staff of core room specialists—men trained to handle coremaking, core sand preparation, and core handling problems—will be available to provide help to San-Blo customers. The services of these men assure the installation of the right machine for the right job, and the proper performance of that machine after its installation.

BACKED BY B&P MANUFACTURING

B&P manufacturing facilities, devoted exclusively to the manufacture of foundry machinery, will be utilized in producing future San-Blo units. Construction of San-Blos will be supervised by competent, experienced production men who have spent their lives in building foundry machinery.

BACKED BY B&P SERVICE

The B&P service organization has been augmented by the addition of San-Blo specialists and the entire staff has been trained to handle San-Blo installation, maintenance and repair. Every San-Blo customer is assured of continuing high caliber service provided on a prompt and reasonable basis. Service contracts are also available.

BACKED BY B&P's GUARANTEE

New San-Blo units manufactured by Beardsley & Piper, like all other B&P units, are fully backed by the guarantee and reputation for quality and performance of the world's largest manufacturer of foundry machinery. This guarantee is another extra provided with every new B&P San-Blo.

B&P **SAN-BLO**

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NOW ADDED TO THE B & P LINE . . .

SAN-BLO CORE AND MOLD BLOWING MACHINES

ROL-O-DRAW CORE ROLLOVER DRAW UNIT

WHIRLMIX CORE SAND MIXER

VIBRA-DRAW CORE DRAWING MACHINE

WONDER WIRE CUTTER

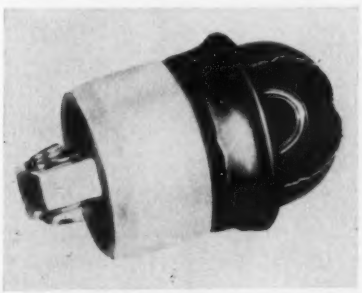
CLIMAX WIRE STRAIGHTENER

FOUNDRY EQUIPMENT AND SUPPLIES DIGEST

For More Details on These Items Use Reply Card —Page 169

EXPENDABLE THERMOCOUPLES

Expendable immersion thermocouple for molten steel temperatures which is discarded after each reading is said to be comparable in cost



to conventional units. It consists of a 1-in. black iron pipe with a handle on one end and a fitting on the other to hold a cartridge. The cartridge and a 4-ft paper sleeve to protect the immersed length of pipe are the expendable items. Both are pulled off and replaced for each reading.

The cartridge, shown in a cutaway view here, is a refractory cylinder with contacts at the receptacle end and a platinum, platinum-10 per cent rhodium thermocouple enclosed in a U-shaped sheath extending from the immersion end. The entire immersion end is enclosed by a sheet-steel cap which melts away in the molten metal to expose the couple. The cartridge easily plugs into place at the end of the holder assembly. **Leeds & Northrup Co.**, Philadelphia 44, Pa.

For More Details Circle No. 430—Page 169

REFRACTORY LINING

Saytite is gunning material for lining ladles and cupolas with a PCE of cone 32-plus and guaranteed maximum moisture content of 3½ per cent or less. Company claims that it lengthens the life of refractory brick and provides time and labor savings. Uniformity of grain size eliminates excessive droppings or rebound. Material is available in bulk or in 100-lb bags.—**Sayre & Fisher Co.**, Sayreville, N. J.

For More Details Circle No. 431—Page 169

METAL REMOVAL TORCH

Model H-2 Arcair torch is for intermittent applications and light uses. It is the smallest manually

operated torch in the company's line and is said to incorporate many improvements over model G-2, which

Image Intensification Speeds X-Ray Inspection

Company's TVX x-ray image intensification system is said to permit economical 100 per cent product inspection on a television-type screen 10,000 times brighter than a conventional fluoroscopic image. Bright enough for easy viewing in normally lighted areas, the viewing monitor provides an image size electronically variable from ½ to 3 times that of the original object without affecting sensitivity.

The system also permits addition of an extra monitor or any ordinary television receiver if simultaneous observation from separate locations is desired. Distance between camera and monitor can be up to 1400 ft. The monitor is equipped with a 12-in. picture tube.—**X-Ray Dept., Industrial Section, General Electric Co.**, Milwaukee 1, Wis.

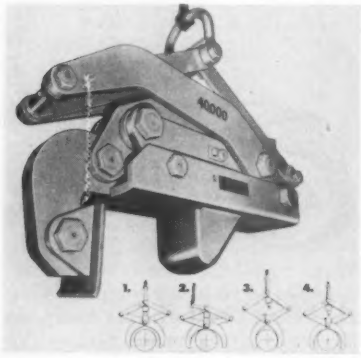
For More Details Circle No. 468—Page 169

it replaces. One feature is a positive air control valve in the torch handle. When the air orifice in the head of the torch is held within 4 in. of the work, the H-2 can be operated on as little as 40 psi of compressed air. The new model also offers heat-resistant molded insulators.—**Arcair Co.**, 465 S. Mt. Pleasant Ave., Lancaster, Ohio.

For More Details Circle No. 432—Page 169

MECHANICAL HANDLING TONGS

Series of automatic mechanical handling tongs is for use in areas where space is too small for lift



truck operation. Tongs operate from mill or S-hooks depending on capacity.

As the tongs, called the Crane-hand, are lowered over the burden in their locked-open position, they automatically unlock on contact and grip the load securely. The heavier the load, the tighter the grip is. When the load is deposited, the tongs automatically resume the locked-open position. Capacities in the series range from 1000 to 50,000 lb, and maximum opening is 50 in.—**American Forge & Mfg. Co.**, McKees Rocks, Pa.

For More Details Circle No. 433—Page 169

DIECASTING LUBRICANT

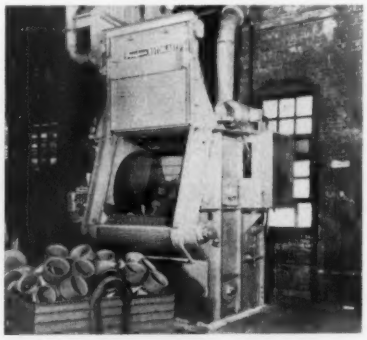
Lubricant and rust preventive called Hamicote is claimed to prevent metal-to-metal contact, eliminate or reduce sticking and toxic fumes, and to stay on the metal. It is said to lower costs by providing uniform, dependable results, increasing die life, and eliminating downtime. It does not form scale or sludge. Releasing action is reported to be improved, and the product is said to remain on surfaces at temperatures up to 3000° F. It can be removed by plain water, alkali solutions, or solvents. A clear, amber, medium-body liquid, it disperses in plain water in any ratio of dilution and forms uniform, white stable emulsions. Nontoxic, it is composed of extreme pressure lubricants plus metal in soluble form and does not contain silicones, manganese, copper, graphite, or suspended matter.—**Harry Miller Corp.**, Fourth & Bristol Sts., Philadelphia 40, Pa.

For More Details Circle No. 434—Page 169

BLAST CLEANING BARREL

Blast cleaning barrel with 20-cu-ft capacity is designed to increase cleaning speed and flexibility while it reduces abrasive loss. A 30-hp motor permits the wheel to throw 50,000 lb of abrasive per hour for rapid blast cleaning, and the work conveyor takes loads up to 3500 lb with single pieces up to 800 lb into the machine. The wheel housing is lined completely with alloy plates.

Abrasive-tight doors and housing retain abrasive within the machine and are said to permit economical use of new types of abrasives. Dur-



ing barrel operations, an abrasive cleaning and reclaiming system removes sand and debris to maintain full efficiency of the abrasive.—**Pangborn Corp.**, Hagerstown, Md.

For More Details Circle No. 435—Page 169

PREFORMED ELECTRODES

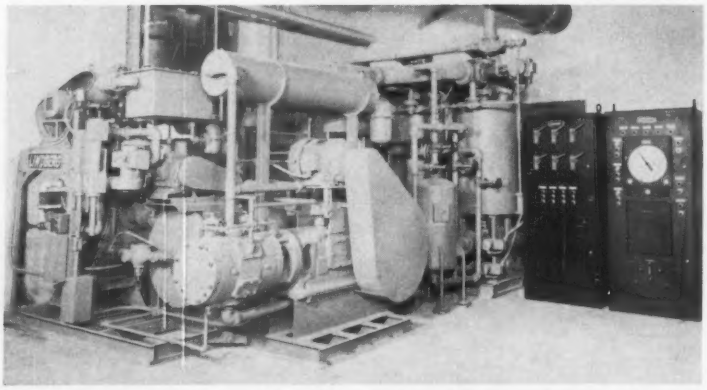
Company has added 12 preformed electrodes for spectroscopic analysis to its line of spectroscopic products, bringing to 52 the total of sizes and shapes of high-purity electrodes available from stock. New electrodes include an assortment with $\frac{1}{8}$ in. diam. Special shapes machined to customer specifications also can be supplied.—**National Carbon Co.**, 30 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 436—Page 169

RUBBER BELT CLEATS

Rema rubber cleat can be applied to rubber conveyor belting in the field without heat or cumbersome equipment by the Rema self-vulcanizing process, developed in West Germany. Prime function of the cleat is to minimize backsliding of

Packaged Unit Produces High-Purity Nitrogen



Nitrogen generator packaged unit is completely piped and wired for production of nitrogen atmosphere by combusting a mixture of air and natural gas or any manufactured gas. The atmosphere produced is said to be CO_2-free, dry combusted gas which can be varied from rich to lean ratios of the air-gas mixture of the exothermic generator. The generator also can be operated on the oxidizing side to eliminate all combustibles. Cost of producing a nitrogen atmosphere by the combustion of natural gas and air is claimed to vary between 13 and 18 cents per 1000 cu ft produced.—**Lindberg Engineering Co.**, 2450 W. Hubbard St., Chicago 12, Ill.

For More Details Circle No. 469—Page 169

material on a sloping belt, thereby helping to increase belt tonnage. Application of the cleats to a belt conveying fine limestone sand in a slurry at a 22½-degree slope increased belt tonnage in a 9-hour day from 250 to 485 tons. Cleats were applied on 4-ft centers.—**Flexible Steel Lacing Co.**, 4607 Lexington St., Chicago 44, Ill.

For More Details Circle No. 437—Page 169

MAGNETIC PARTICLE TEST KIT

Combination yoke-coil magnetic particle testing kit, the YL-51, is said to detect both transverse and longitudinal cracks in ferrous parts and to demagnetize parts after completion of the test. Operation is from 110-volt current.

Unit consists of a magnetizing coil, a two-pole yoke, two powder dispensers, 1 lb each of gray and black powder, two 25-ft power cords, and a metal carrying case. Either the coil or the yoke is used to establish the required magnetic field in the part, and cracks are detected by applying the inspection medium and observing powder indications. Only one man is needed. The complete kit weighs 45 lb, including carrying case.—**Magnaflux Corp.**, 7300 W. Lawrence Ave., Chicago 31, Ill.

For More Details Circle No. 438—Page 169

HIGH-HEAT CYLINDERS

Standard air and hydraulic cylinders are said to permit continuous elevated-temperature operation in applications where heat formerly prevented use of hydraulic or pneumatic power.

Design of the cylinders centers around high-temperature packings which make high-heat operation possible. All packing areas have lifetime high-temperature silicone grease in adjacent grooves. This combination reportedly permits efficient operation at temperatures as low as −20° F as well as in the elevated ranges.

Pressure service ratings are to 150 psi for the air cylinders and to 350 psi for the hydraulics. Size range for standard units is 1½ to 8-in. bore with stroke lengths to 18 ft.—**Carter Controls Inc.**, 2800 Bernice Rd., Lansing, Ill.

For More Details Circle No. 439—Page 169

EPOXY-BASED RESIN

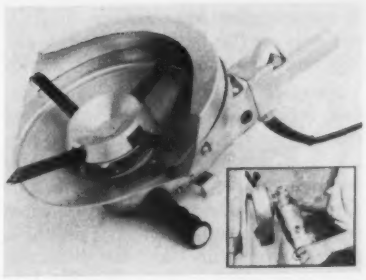
Maskast is an easy-pouring, rapid-curing material for the fabrication of tough, large, nonshrinking mass-casts. It possesses a relatively low viscosity and is a two-component, black, epoxy - based liquid casting resin.

Characteristics include low exotherm in large-sectioned castings and toughness after room-temperature cure. Hardness and resiliency can be controlled within limits by variations in the amount of flex-imparting hardener used.—**Hastings Plastics Inc.**, 1551 Twelfth St., Santa Monica, Calif.

For More Details Circle No. 440—Page 169

SURFACE PREPARATION UNIT

Roto-Scraper is a tool for surface preparation or cleanup of many materials including metals. It consists of four cutting-blade units, each with 24 steel blades bent in hairpin shape and housed with a safety guard. Blades are rotated by a high-speed, nondrill-type portable motor. The unit weighs 3¾ lb plus motor and operates on 115 volts.—**Roto-Scraper Co.**, Alhambra, Calif.

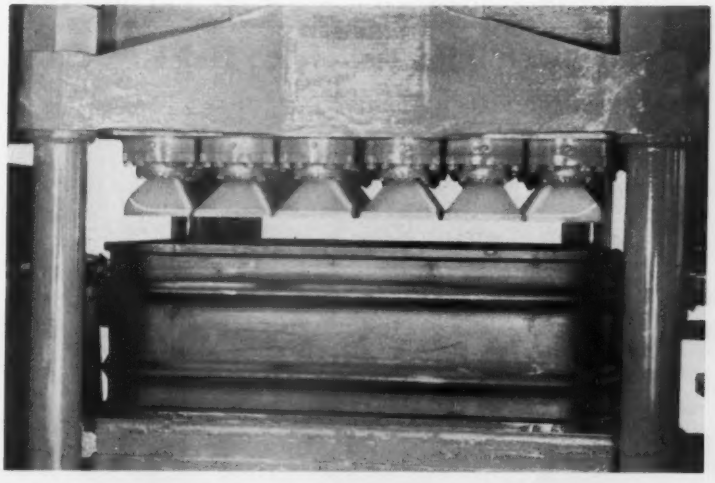


For More Details Circle No. 441—Page 169

TUNNEL KILN PYROMETER

Traveling tunnel kiln pyrometer is designed to record temperatures to which work passing through a kiln is subjected during the entire run. That continuous record makes pos-

Molding Machine Offers Versatile Operation



Moldmaster is a jolt-squeeze-strip molding machine designed to operate by automatic, semi-automatic, or pushbutton controls. It includes two stripping stations and one ramming station. The center or ramming station operates on each molding cycle, and the stripping stations operate alternately.

Unit offers simultaneous jolt-squeeze action. The squeeze head is self-adjusting and is attached to the jolt machine table to aid ramming and reduce wear. Cope and drag molds or molds with two different types of patterns can be made simultaneously on this machine.

The unit also is adaptable for molding with flasks of different heights and incorporates adjustable strikeoff bars. Other numerous features include absence of electronic controls, self-contained oil reservoirs, fast pattern change.—**Herman Pneumatic Machine Co.**, Union Bank Bldg., Pittsburgh 22, Pa.

For More Details Circle No. 470—Page 169

sible accurate adjustments to kiln controls on the basis of actual working temperatures.

Swaged thermocouples of specified length are mounted on a test car in the required locations. They are connected to a potentiometer by an armored extension cable containing a pair of extension wires for each thermocouple. The cable is fed from the recorder into the kiln and drawn through the kiln with the test car.—**Bristol Co.**, Waterbury 20, Conn.

For More Details Circle No. 442—Page 169

TRACTOR-LOADER

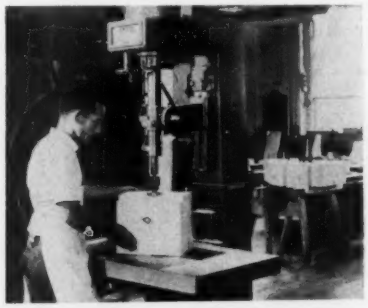
Industrial tractor is built in such a manner that vital "equipment" such as the driver, engine, hydraulic pumps, and steering system are isolated from members of the tractor which take the biggest beating in industrial service. The tractor is equipped with hydraulic power steering, requiring less than a complete turn to go from straight ahead to full right or full left. A foot throttle allows operators to override hand-set operating speed, giving faster shuttling, and frees his right hand to control the loader. The tractor has a wheelbase of 81.5 in., length of 128 in., and turning circle diameter (with brakes) of approximately 22 ft. The four-cylinder gasoline engine develops 42.5 drawbar horsepower; a diesel engine is available. Shipping weight is 3800 lb. The loader, developed for use with this tractor, has 2500-lb capacity and dump height of 8 ft 5 in. Bucket sizes are $\frac{5}{8}$ or $\frac{3}{4}$ cu yd. An independent hydraulic system powers the loader. Attachments include a snowplow, dozer blade, and rear-mounted crane.—**Tractor & Implement Div., Ford Motor Co.**, Birmingham, Mich.

For More Details Circle No. 443—Page 169

DRILLING MACHINE

Precision drilling machine was designed expressly to meet needs of modern pattern shops. It features an extra-large, plain-surfaced, tilt-top table; deep spindle nose to table capacity; heavy-duty spindle and quill; and wide speed range.

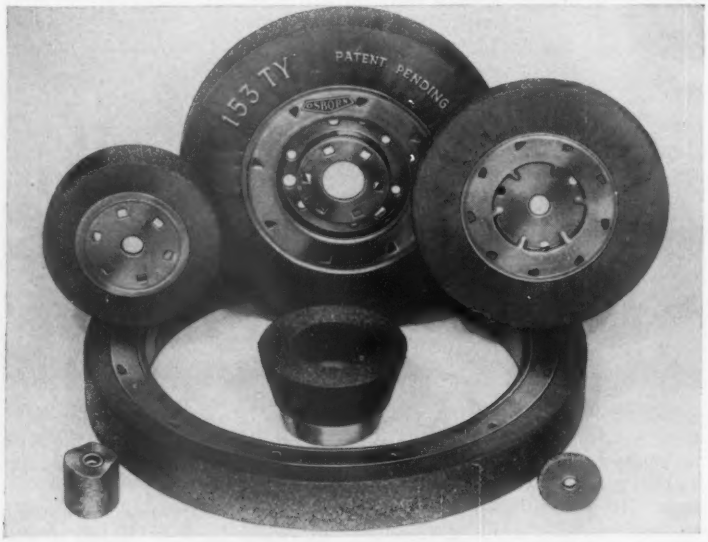
Table is 40 in. wide, 23 in. deep, tilts to 45 degrees to either side, and has a smooth top to facilitate work handling. Speeds from 150 to 3600 rpm are available through a four-speed motor and back gears. A handwheel changes speeds and



shifts gears without stopping the machine. Speed settings are indicated on an illuminated chart. The machine also is capable of handling metal or plastics drilling operations. —**Leland-Gifford Co.**, Worcester 1, Mass.

For More Details Circle No. 444—Page 169

Power Brush Does Variety of Finishing Jobs



Basic principles of power brushing are said to be extended to new areas by the TY brush. This product is said to perform such finishing jobs as deburring, flash removal, surface juncture blending, and removal of scale or oxide on metal parts, yet to offer greater tool life, more brushing action strength, minimum wire breakage, and positive control. It is adaptable to use on automatic and semiautomatic equipment where high production and long tool life are essential.—**Osborn Mfg. Co.**, 5401 Hamilton Ave., Cleveland 14, Ohio.

For More Details Circle No. 471—Page 169

AIR LINE LUBRICATOR

Automatic-fill, air line lubricator is designed to eliminate maintenance and downtime associated with manual filling. It features a built-in float mechanism which automatically maintains a constant oil level in the lubricator bowl when fed by an oil supply line with pressure from 10 to 100 psi greater than the air pressure applied to the lubricator. Unit is available in $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1-in. sizes.—**Watts Regulator Co., Industrial Div.**, Ten Embankment Rd., Lawrence, Mass.

For More Details Circle No. 445—Page 169

FIRST-AID KITS

First-aid kits are designed to facilitate emergency treatment through use of unit-wrapped items. Each kit, contained in a 20-gage steel box with rubber-gasketed lid, has a facsimile index on the inside of the lid which shows exact location of

NOW — the *first* MELTING STOCK manufactured in the United States available to America's Steel Mills - -

HOEGANAES SPONGE IRON

a new source of metallics for the steel industry

The very first on the American market. These Ancor Sponge Iron Briquettes are virgin, soft iron of extreme purity, free from tramp elements and dissolved gases. They're time-tested and field-tested as a raw material for quality steel production, primarily in acid open hearths, induction furnaces and basic electric arc furnaces.

Hoeganaes Ancor Sponge Iron is a metallic product reduced from iron ore at such low temperature that melting of the iron or the gangue constituents has not taken place. *They have exceedingly uniform analysis from shipment to shipment.*

This is of importance too . . . the following elements are non-existent or only present in trace amounts . . . Nickel, Molybdenum, Cobalt, Zinc, Hydrogen, Nitrogen, Chromium and Tin. Ancor Sponge Iron has a very high degree of reduction—96%. It performs at least as well as a low-carbon, high-grade ingot iron.

If you're interested in *regularity of your melting operation* and *greater uniformity of your steel analysis*, be sure to write for the fact-filled literature. Better still, ask for a Hoeganaes Engineering Specialist to call and give all the facts first hand. He's at your service.

Write for literature containing basic facts, typical analysis and working data . . . ask for Form No. 113

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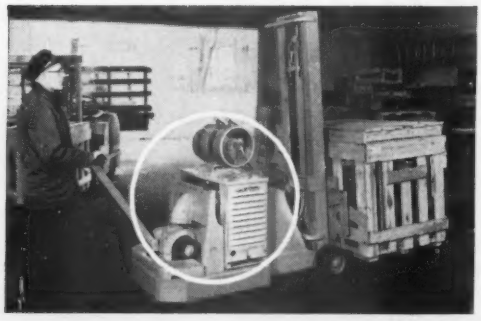
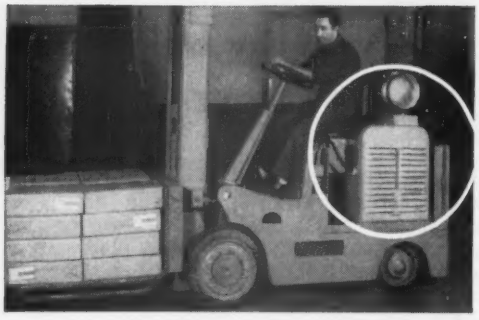
SALES REPRESENTATIVES IN PRINCIPAL CITIES: Birmingham, Chicago, Cincinnati, Cleveland (Fostoria), Edmonton (Alberta, Canada), Los Angeles, Minneapolis, New England (Elmira, N.Y.), Philadelphia (Riverton, N. J.), Pittsburgh, San Francisco, St. Louis

Get the Advantages of READY-POWER on Your Electric Industrial Trucks



Get Live Power for Walkie Trucks

Ready-Power's popular bantam model "W" is equipped with dependable 12-volt automotive-type starting and ignition. Variety of idling speeds and easy accessibility make it ideal for all walkie trucks as well as rider trucks up to 2,000 lbs.

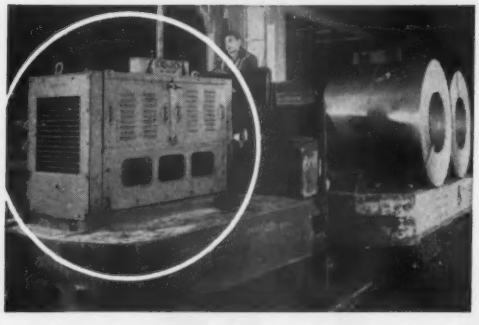


Work Your Fork, Platform, Tractor Trucks 'Round the Clock

Ready-Power gas-electric and LPG-electric units give materials handling trucks continuous, full power all the time. Slowdowns due to power fatigue are eliminated. The simple, all-electric control and live response make Ready-Power-equipped trucks rate high with truck operators.

Energize Lift Magnets on Your Electric Trucks

In the application shown at the left, the Ready-Power unit not only powers the truck, but also energizes the lift magnet for handling scrap metal. Ready-Power units are removable for shop adjustment while a spare keeps trucks working.



Get Diesel Electric for Lowest Ton-Mile Costs

Take a tip from the owners of industry's biggest trucks . . . power them with Ready-Power diesel-electric for maximum stamina, dependability, and lowest operating costs. Ready-Power offers power for every size and make of electric truck.

Your Truck is No Better than its Power . . . Write for Information on Ready-Power gas-electric, LPG-electric, and Diesel-electric Units

READY-POWER

The READY-POWER Co., 3819 GRAND RIVER AVE., DETROIT 8, MICH.

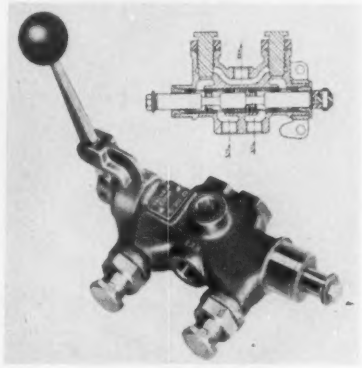
Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

all items and gives instructions for their use. The index also serves as an inventory control. Kits are available in sizes of 10, 16, 24, or 36 units, with standard assortments of first-aid items or with custom assortments to meet special requirements.—**General Scientific Equipment Co.**, Box 3038, Philadelphia 50, Pa.

For More Details Circle No. 446—Page 169

CONTROL VALVE

Manually - operated, four - way valve with built-in speed control is designed for precise operating speed



regulation of double-acting cylinders and similar devices in either or both directions. Valve is offered in $\frac{1}{4}$ or $\frac{3}{8}$ in. NPT ports and as a standard lever-operated type; a spring-centered neutral type; or with any desired applicable combination of standard manual valve end sections.—**Valvair Corp.**, 454 Morgan Ave., Akron 11, Ohio.

For More Details Circle No. 447—Page 169

COATED WORK GLOVES

Line of work gloves includes neoprene, vinyl plastic, and rubber-coated types. The neoprene gloves are claimed to be liquidproof and to resist acids, solvents, and caustics. They are recommended wherever heat, snagging, or cutting are a danger. Gloves coated with natural rubber offer good grip and excellent resistance to cutting, abrasions, heat, and punctures.—**Riegel Textile Corp.**, 260 Madison Ave., New York 16, N. Y.

For More Details Circle No. 448—Page 169

PROPANE DILUTER

To maintain heat processing operations during periods of fuel cut-off, a propane diluter automatically supplies accurate mixtures of propane or butane and air. It provides simple interchangeability without

CARROLL'S SAFETY-GUARD INSERTS

Give you BUILT-IN Operator Safety and Top Performance.

This radically new Safety Guard Insert with its integrated revolving guard gives you the all-important safety factor with increased wheel strength and efficiency.

Added economies in production are gained from the ready-made molding form provided by the Guard. True dynamic balance, back flatness and concentricity, show consistently close tolerances within .010 T.I.R.

Safe grinding wheels mean increased production — use and specify wheels with the new Carroll Safety Guard.

• A Positive Guard on Every Cup Wheel • Highest Safety Factor • One Piece Assembly • Increased Strength • Light Weight • Fool Proof Mounting • No Adjustment Necessary • True Dynamic Balance

PM INC. *Write for Information on Carroll's Safety Guard Insert*

CARROLL
PRESSED METAL, INC.
133 DEWEY ST.
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Circle 637 on Page 51

adjusting machinery or gas burners and can be connected to existing gas piping. Design of the diluter incorporates a balanced pressure, full floating mixing valve with precision-machined gas and air metering ports. The valve is adjusted through a vernier-type wormwheel mechanism for precise control of gas-air ratio and is capable of turndown through a range of 50 to 1. —**Selas Corp. of America**, Dresher, Pa.

For More Details Circle No. 449—Page 169

ELECTRIC TRUCKS

Line of electric, standup, center-control fork trucks is available in 4000, 6000, 7000, 8000, and 10,000-lb capacities. All feature front-wheel drive and rear-wheel steering. Frames are heavy-gage, reinforced steel plates electrically welded into a rigid, box structure. Uprights are of alloy steel, and inner uprights and elevator mechanism are designed to move on widely spaced rollers. Other features include contactor control with automatic acceleration; four speeds forward and reverse; and direction and acceleration through a single hand-control lever.—**Elwell-Parker Electric Co.**, 4205 St. Clair Ave., Cleveland 3, Ohio.

For More Details Circle No. 450—Page 169

AIR-HYDRAULIC TRIM PRESS

Addition to company's line of air-hydraulic trim presses for trimming

diecastings is a 35-ton press with 40 x 48-in. free working area inside the 4-in. tie bars. It has a 30-in. stroke, approach speed of 1400 ipm, pressing speed of 140 ipm, and return speed of 700 ipm. The machine is 11 ft high and weighs 19,000 lb.

Air-hydraulically actuated, it obtains its high speed by forcing air in behind the piston ram under an accumulator system. A fast-acting

In the tap hole area of a malleable iron furnace with metal tapped at 2840° F, *IRONTON* BERLITE mortar is ***more refractory than super-duty brick.*** When the furnace was shut down for repairs after running 16 hour heats, pouring 400 tons a day for weeks, we took the photograph above. The joints of *IRONTON* BERLITE stand out like a backbone along the brick sidewall.

TOUGHEST MORTAR YET

IRONTON BERLITE will outlast any fire clay material. For an actual photograph and service report on BERLITE in a really hot installation, write to our Special Products Division.

You can have on-the-spot consultation without obligation. Call or write Ironton to arrange for a visit by our experienced foundry engineers.

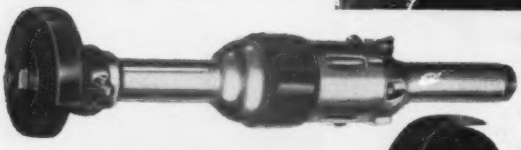
THE IRONTON FIRE BRICK COMPANY
SINCE 1917
IRONTON, OHIO
1301 Robinson Street
Reliable Refractories

Write for name of nearest representative, or telephone Ironton 109

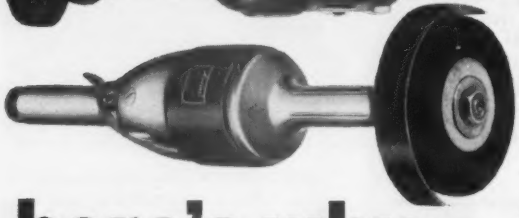
Circle 638 on Page 51

AIRETOOL

pneumatic grinders can cut your metal removal costs . . .



MODEL 600
6" wheel capacity, 6000 to 9000 rpm, length 22", weight 9 lbs.



MODEL 700
8" wheel capacity, 4500 to 6000 rpm, length 22", weight 12 lbs.

Thumb throttle, lever throttle, roll throttle, or grip handle with trigger throttle, optional on both models.

here's why—

POWER Plenty of reserve power to handle toughest snagging jobs . . . no stalling even under severest loads.

SPEED Constant speed is maintained without vibration for faster metal removal . . . longer wheel life.

MANEUVERABILITY Lightweight balanced design makes operation around intricate construction easier . . . less operator fatigue.

LOW OPERATING COST Pneumatic tools are far more economical to operate than any other power equipment.

LONG LIFE Precision construction with hardened steel operating parts assures long maintenance-free service.

VERTICAL GRINDER for fast finishing of flat or curved surfaces. Takes cup wheel, sanding disc or wire brush. Models for 6" abrasive wheel and 7", 8" or 9" disc wheel.

WRITE FOR CATALOG No. 63 on complete line of Airetool Pneumatic Tools and accessories.

BRANCH OFFICES:
New York, Chicago, Philadelphia, Tulsa, Houston, Baton Rouge.

REPRESENTATIVES in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America, Hawaii, England, Italy, Europe, Japan. CANADIAN PLANT: Brantford, Ontario. EUROPEAN PLANT: Vlaardingen, The Netherlands.

valve allows free flow without cavitation behind the head. As the ram travels, a solid column of oil is forced in behind the piston by air at 20 psi. Just before the trimming cycle, pump pressure for the shearing action of the press is cut in with a cam.—**B & T Machinery Co.**, Holland, Mich.

For More Details Circle No. 451—Page 169

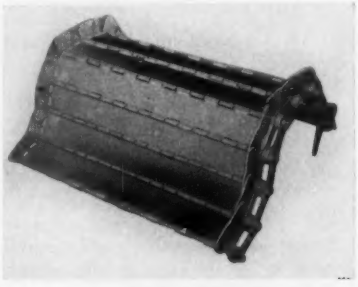
FIRE EXTINGUISHER

Wheeled, dry-chemical fire extinguisher with 200-lb capacity of chemical is for use on inflammable liquid, liquefied petroleum gases, or electrical fires. It features a universal nozzle which discharges a dense 40-ft dry chemical stream. Total discharge time is 35 seconds. To use it, the operator removes the safety pin, swings the valve toggle, and flips the on-off nozzle lever. Unit is operable over a temperature range from −40 to +120° F. —**Walter Kidde & Co.**, Belleville, N. J.

For More Details Circle No. 452—Page 169

STEEL BELT

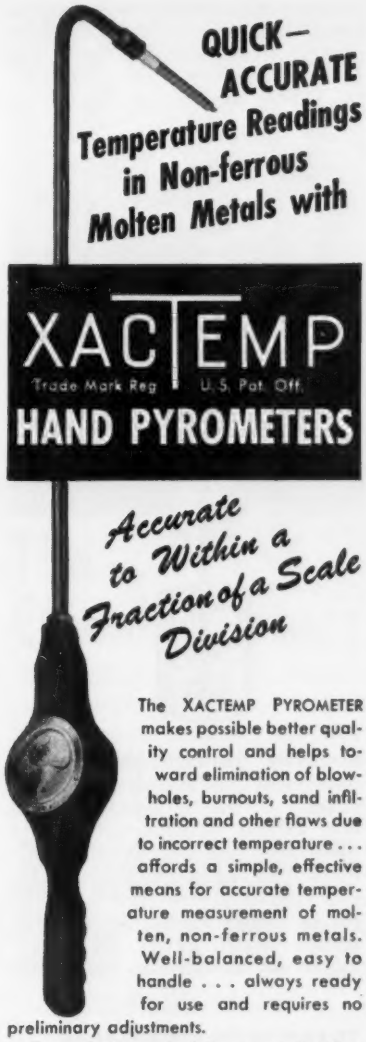
Steel belt is constructed for heavy-duty handling of metal parts or scrap or wherever else a rugged carrying surface is required. It offers 6-in. pitch, with ¾ in. through pin, and is made of 3/16-in.-thick steel or other metal. Hinges are continuous across width to eliminate gaps. Wheels are solid steel, case hardened for wear, with oilite bushings for low coefficient of friction and elimination of galling. Standard diameters are 2 and 2⅝ in. with 1½-in. face. Overlapping side wings are self-cleaning type. Standard heights are 2, 3, and 4 in.—**Prab Conveyors Inc.**, 30121 Groesbeck Highway, Roseville, Mich.



For More Details Circle No. 453—Page 169

EXPANDING GRINDING WHEEL

Expanding grinding wheels composed of metal hubs to which rubber is molded are said to eliminate the need for backstand idlers with



The XACTEMP PYROMETER makes possible better quality control and helps toward elimination of blowholes, burnouts, sand infiltration and other flaws due to incorrect temperature . . . affords a simple, effective means for accurate temperature measurement of molten, non-ferrous metals. Well-balanced, easy to handle . . . always ready for use and requires no preliminary adjustments.

Cast aluminum and brass construction. Indicator is of medium resistance not affected by thermocouple length . . . acts rapidly . . . provided with Alnico V magnet and direct reading dial starting at 50° F. 43" stainless steel extension . . . standard 7" Marshall tip permits true readings below surface of metal. Made to give good service for years. Order at once to be sure of immediate delivery from stock.

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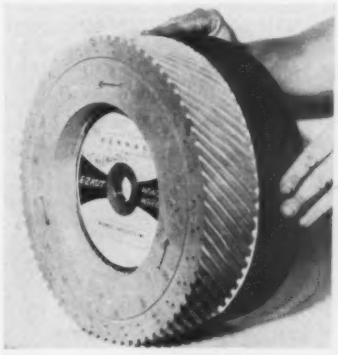
Circle 640 on Page 51

coated abrasives. The abrasive band is fitted loosely around the wheel while it is at rest, and centrifugal force created at operating speeds causes the wheel to expand and grip the band.

Advantages claimed by the manufacturer include superior cutting power, more safety, inventory and space savings, ease of operation, and



elimination of mechanical failures.—**Mermac Products Inc.**, 1144 S. Kostner, Chicago 24, Ill.

For More Details Circle No. 454—Page 169

DIECASTING RELEASE AGENT

Dylube 710 is a diecasting release agent said to eliminate carbon deposits, contribute to filling deeply cored areas, end gassing and reduce porosity, speed metal flow, avoid hot spots, minimize washout of die in gated areas, and end smoking, discoloration, corrosion, or bloom on castings. A lubricating film between die and molten metal reportedly prevents drag marks, solder, sticking, and other release problems.

The product is especially effective with aluminum and magnesium, but also is suitable for zinc and brass diecasting. Its boil and flash points are said to be substantially higher than the highest possible die operating temperature. Application is by brush, blowgun, pad, or glove tip.—**American Charcoal Co.**, 201 S. Green St., Detroit 17, Mich.

For More Details Circle No. 455—Page 169

FORK LIFT TRUCK

A 6000-lb, pneumatic tire fork truck with a 12-month unconditional guarantee on the clutch is designed for easy maintenance. Features include a clutch that operates at less than half engine speed, simplified lubrication system, power steering, and single or dual drive wheels. Dimensions are 6 degrees forward tilt, 11 degrees rearward tilt, 116 in. over-all length less

Low cost 3/4 inch lining of CARO-LINE handles 120 ladles of iron
All-day operation at high temperatures has proved that IRONTON CARO-LINE can deliver superior service in any malleable iron or electric steel ladle. One Ohio malleable foundry pouring iron at 2860° F. fills its 250 lb. ladle 120 times before relining. The economy key is in the thickness of the lining—only ¾ of an inch! If you melt
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you ought to know more about CARO-LINE. Ironton makes this highly siliceous refractory for "grief proof" linings in ladles and furnaces. Saves labor, ends scrap loss, furnace repairs, slaggy metal.
Ask Ironton to send the "MAN WHO KNOWS" to your foundry for on-the-spot consultation.
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1303 Astabula Street
Reliable Refractories
Write for name of nearest Ironton man, or telephone Ironton 109

Circle 641 on Page 51

forks, 45 in. over-all width with single tires, 63½ in. with dual tires, 66-in. wheelbase, 6-in. underclearance, 115-in. outside turning radius, and 135-in. plus load length for right-angle stacking.—**Mercury Mfg. Co.**, subsidiary of **Pettibone Mulliken Corp.**, 4710 W. Division St., Chicago 51, Ill.

For More Details Circle No. 456—Page 169

SHOT BLAST LINERS

Blastmor shot blast liners are overlaid in critical areas with a patented steel of great resistance to abrasion. Latter is combined with lower alloy steel in areas of minimum blast. Liners are manufactured from forged bars to reduce the wide performance ratios often found in cast liners, the company states.

The abrasion-resistant steel reportedly gives performance life four to ten times that of premium parts and superior performance 100 to 1 over standard parts. It is a high carbon chromium die steel which contains a high percentage of both carbon and vanadium. Vanadium carbides provide the abrasion-resistant qualities.—**Latrobe Steel Co.**, Latrobe, Pa.

For More Details Circle No. 457—Page 169

PLASTIC MIXER

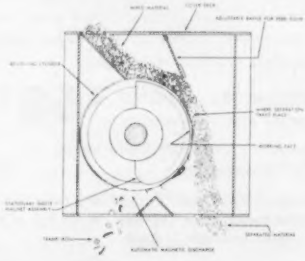
Gyro plastic mixer is designed to blend liquid resins and hardeners in one-third to one-half the time required by hand mixing. It is said

to insure thorough blending and consequent uniform hardening of mixes. It will mix pints, quarts, and gallons without overflow or splashing, and the mix does not touch the operator's hands. Unit can be used in any electric drill.—**Plaster Supply House**, Box No. 551, Chicago 90, Ill.

For More Details Circle No. 458—Page 169

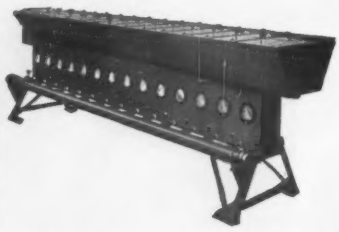
TRAMP IRON SEPARATORS

A permanent magnet drum is the latest development in a line of tramp iron separators which use Index V ceramic magnets. The drum separators are designed for



easy installation in enclosed-chute or spout-conveying systems.

Index V is an oriented barium ferrite material with a high energy product. Magnets made of it reportedly possess such advantages as light weight, high electrical resistivity, and great resistance to de-



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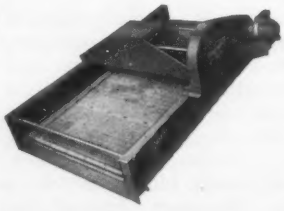

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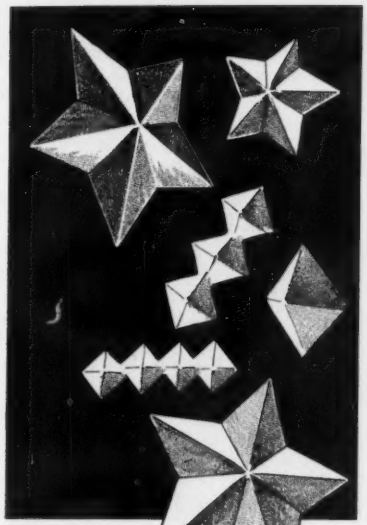

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3"	220.	"	"

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Circle 643 on Page 51

magnetization. Drum diameters range from 12 to 24 in.—**Stearns Magnetic Products,** 635 S. 28th St., Milwaukee 46, Wis.

For More Details Circle No. 459—Page 169

AIR FILTER

Air filter is designed to remove all traces of oil and other contaminants as small as 5 microns from compressed air systems. Highly absorbent Micro-Pak disposable textile cartridge is said to filter out unusually large quantities of contaminants before replacement is required. Unit efficiently handles up to 150 cfm at 100 psi with minimum pressure drop. It is available in pipe sizes from ¼ to 1 in. NPT and will operate on pressures up to 250 psi.—**Wilkerson Corp.,** 1650 W. Girard Ave., Englewood, Colo.

For More Details Circle No. 460—Page 169

PORTABLE PYROMETER

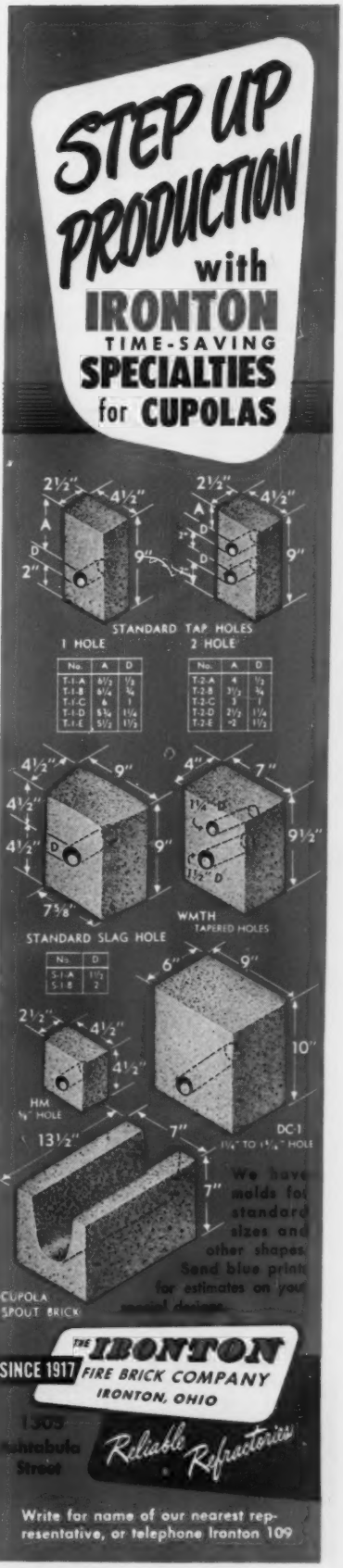
No power source, special tools, or operator skill are required for this

portable hand pyrometer, it is claimed. The unit may be used for measuring temperatures of convex, rotating, or flat surfaces, plastics, rubber or semifluids, liquids, gases, or molten soft metals. Available accessories range from flexible or rigid arm extensions to a variety of thermocouples. Twelve scale ranges, all automatically compensated for changes in ambient temperature, are offered. — **West Instrument Corp.,** 4363 W. Montrose Ave., Chicago, Ill.

For More Details Circle No. 461—Page 169

POWER CHECK

Inline single-acting hydraulic power check is designed to provide precise feed control of air cylinders and other machine feed components. It checks thrust loads up to 1500 lb and provides checking action on either forward or reverse stroke, with unrestricted movement



Circle 644 on Page 51

on the opposite stroke. Applied to pneumatic cylinders, it reportedly prevents chatter and flutter.

Self-contained, it consists of an oil-filled, spring-loaded cylinder, checking piston and piston rod, and an extra-sensitive needle valve control. It is installed by attaching the cylinder to a fixed portion of the machine and piston rod to be controlled. Unit is available in six sizes with strokes from 2 to 12 in. —**Appco Corp.**, P. O. Box 6, Olmsted Falls, Cleveland, Ohio.

For More Details Circle No. 462—Page 169

FLOW INDICATOR

Arkon flow indicators show at a glance whether flow is taking place. A chromium-plated ring spinning under a toughened glass shows movement and avoids the possibility of misreading the device. These indicators are useful wherever there is circulating water or oil.

Variable flow models can be reset easily for high or low range and are available with diecast brass body in ½, ¾, and 1-in. pipe sizes for flows from 0.72 to 24 gpm. Other models are available for flows from 0.075 to 120 gpm in pipe sizes up to 3 in. — **McIntosh Equipment Corp., Walker Crosweller Div.**, 15 Park Row, New York 38, N. Y.

For More Details Circle No. 463—Page 169

STATIONARY COMPRESSOR

Stationary air compressor, the 25S2 is said to fill needs for a high-volume, high-pressure unit. A 25-hp model, it is rated for continuous duty at 175 psi and also is available at 125 psi. Displacements are 120 cfm at 175 psi and 870 rpm and 133 cfm at 125 psi and 960 rpm. The 25S2 is a two-stage, aircooled, electric-motor-driven compressor for applications in which compactness, light weight, and minimum operator attention are required. With the motor moved partially beneath one low-pressure cylinder, complete unit length is 60¼ in. Width is 37 in., height 42 in., and weight 1810 lb. Standard equipment includes a Dual-Control which gives a choice of start-and-stop duty of both compressor and motor or continuous running of the motor with intermittent compressing.—**Le Roi Div., Westinghouse Air Brake Co.**, Milwaukee 1, Wis.

For More Details Circle No. 464—Page 169

HELMET-SOUND PROTECTOR

Combination welding helmet and sound protector was developed to protect welders who work where

there is loud noise. The sound protector unit employs ear domes which cover the jawbone opening and protect against both high and low-frequency noises. Vinyl sponge ear seals fit securely, even over glasses.

The welding helmet unit is moistureproof and well ventilated. Shell is made of strong, lightweight fiber-glass. Adjustable friction joints hold the helmet at desired tension, and a fiber chin rest keeps it properly aligned. Snap-on, chrome-leather side attachments are avail-

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When a new wheel is used, sharp abrasive grains are worn dull . . . wheel pores tend to fill with metal . . . grinding efficiency goes down. But you can keep all grinding wheels at top efficiency by dressing them regularly with inexpensive Desmond mechanical dressers.

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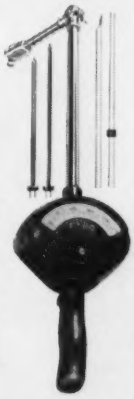

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Circle 646 on Page 51

able for added protection.—American Optical Co., Safety Products Div., Southbridge, Mass.

For More Details Circle No. 465—Page 169

ELECTRO-HYDRAULIC HOISTS

Electro-hydraulic servo-hoists are said to extend speed, controllability, power, and safety characteristics of hydraulic actuation to all industrial lifting operations. Units are available with nominal capacities of ¼,

½, 1, and 2 tons. Each can raise material up to 10 ft.

Design features include precision positioning, adjustable speed action, one-hand operation, and fingertip control. Lifting speed is claimed to be stepless and infinitely adjustable up to three times that of conventional hoists. The entire powering mechanism is contained in the overhead trolley assembly, and fail-safe design prevents any effect on load holding or lowering if power fails or is disconnected.—**Pesco Products Div., Borg-Warner Corp.**, 24700 N. Miles Rd., Bedford, Ohio.

For More Details Circle No. 466—Page 169

FORK LIFT TRUCKS

Lift truck operators can control all forward and reverse movements with a treadle-type pedal operated by simple heel-and-toe action of the left foot. The drive provides instantaneous power application and eliminates much of the mechanism ordinarily required to operate a fork lift truck. Called Towmostatic drive, it does not require clutch assembly, transmission, drive line, differential, or manual shifting levers. With a little practice, even normal braking can be achieved by simple operation of the drive pedal.

The new drive is reported to increase grade "pull" about 20 per cent with rated load and to lower maintenance costs. It provides smooth creeping and inching.—**Towmotor Corp.**, 1226 E. 152nd St., Cleveland 10, Ohio.

For More Details Circle No. 467—Page 169

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Circle 647 on Page 51

Literature for Foundrymen

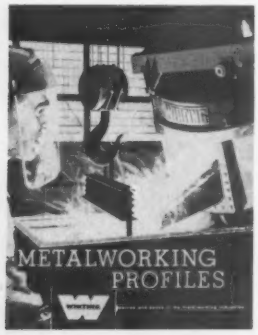
Core and Mold Blowers

Booklet presents diagrams, sketches, photographs, and charts on San-Blo core and mold blowing machines. Application of the machines to various sand mixtures and types of coreboxes also is discussed. —**Beardsley & Piper,** division of **Pettibone Mulliken Corp.,** 2424 N. Cicero Ave., Chicago 39, Ill.

For More Details Circle No. 401—Page 169

Equipment Usage

Booklet entitled "Metalworking Profiles" presents performance reports covering the use of Whiting Corp. equipment in several companies. Among the products described are electric furnaces, cranes,



overhead handling systems, and a freight car mover equipped with wheels for road and rail.—**Whiting Corp.,** 15600 Lathrop Ave., Harvey, Ill.

For More Details Circle No. 402—Page 169

Dust Collector

A wet inertial type dust collector is described in Bulletin J-616 which contains performance curves, specifications, cutaway drawings of the inner construction and describes a related filter for reclaiming or removing collected slurry.—**Joy Mfg. Co.,** Oliver Bldg., Pittsburgh 22, Pa.

For More Details Circle No. 403—Page 169

Refractories

Vol. 3, No. 3 of "Refractories by Carborundum" is devoted to thermal expansion and how to allow for it. Several diagrammatic sketches are included in the issue which has sections devoted to expansion due to temperature change, refractory materials to provide for expansion, and super refractories data. — **Carborundum Co.,** Perth Amboy, N. J.

For More Details Circle No. 404—Page 169

Radiography

Booklet, "Industrial Radiography," describes the principles of radiography and discusses the choosing of a radiation source, exposure calculations, methods of making exposures, and presents several types of camera equipment. —**Princeton Division, Curtiss-Wright Corp.,** Box 110, Princeton, N. J.

For More Details Circle No. 405—Page 169

Fluid Power Cylinders

Information sheet discusses factors in the selection of power cylinders for specific applications. Some factors relate to operation conditions; others involve cylinder design and material considerations.—**Miller Fluid Power Division, Flick-Reedy Corp.,** 2040 N. Hawthorne Ave., Melrose Park, Ill.

For More Details Circle No. 406—Page 169

Sand Control

Numbers one and two of Vol. 2 "Sand Conditioning Topics" present the first two of a series of articles on basic sand control and conditioning by W. P. Winter, assistant professor of industrial engineering, Pennsylvania State University.—**Royer Foundry & Machine Co.,** 159 Pringle St., Kingston, Pa.

For More Details Circle No. 407—Page 169

Diecasting Machines

Descriptions and specifications on high-pressure hydraulic diecasting machines ranging in locking pressures from 50 to 1000 tons are contained in a general bulletin.—**Cleveland Automatic Machine Co.,** Cincinnati 12, Ohio.

For More Details Circle No. 408—Page 169

Shell Mold Parting Agents

Service Manual 5-116, covering silicone parting agents for the shell molding process, tells how to break in patterns, how to obtain easy release of sand-resin shells and cores, and how to clean patterns.—**Dow Corning Corp.,** Midland, Mich.

For More Details Circle No. 429—Page 169

Barrel Finishing Machines

Multiple-compartment barrel finishing machines are illustrated and described in Bulletin 201.—**Techline,** a division of **Wheelabrator Corp.,** 1102 Avenue V, Vicksburg, Mich.

For More Details Circle No. 409—Page 169

Molding Machines

Bulletin 146-NA describes fully automatic jolt-squeeze-strip (pin lift) molding machines having a time cycle of 12-15 seconds. Specifications are given for two sizes of machines taking maximum flask sizes of 24 x 18 in. and 30 x 21 in. Larger sizes are available. Similar machines without automatic operation also are described.—**F. E. (North America) Ltd.,** 47 Advance Rd., Toronto 18, Ont., Canada.

For More Details Circle No. 410—Page 169

Speed Reducers

A new line of shaft-mounted speed reducers is described in Reference Book 2618, covering engineering and selection information on single reduction drives in six

sizes with nominal ratios of 5 to 1 and capacities up to 50 hp, and double reduction drives in seven sizes with nominal ratios of 15 to 1 and up to 40 hp.——**Link-Belt Co.,** Dept. PR, Prudential Plaza, Chicago 1, Ill.

For More Details Circle No. 411—Page 169

Motor Control Centers

Descriptions and specifications of the company's line of industrial motor control centers in NEMA sizes one through six are presented in Bulletin GEA-4979D. This equipment is used where two or more alternating current and/or di-

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●

rect current motors can be controlled from a central location.—**General Electric Co.**, Schenectady 5, N. Y.

For More Details Circle No. 412—Page 169

Powder Lance

Folder 1153 describing a tool capable of slicing through metal or concrete of any thickness also outlines the origin, principle, and scope of the powder-lancing process. Applications in foundries and other industries are described.—**Linde Co.**, division of **Union Carbide Corp.**, 30 East 42nd St., New York 17, N. Y.

For More Details Circle No. 413—Page 169

Casting Alloys

"Metal Specifications and Practices in the United States" contains graphs, photomicrographs, and electron micrographs to help describe the development and standardization of investment casting alloys used in the United States.—**WaiMet Alloys Co.**, 1999 Guoin St., Detroit 7, Mich.

For More Details Circle No. 414—Page 169

CO_2 Process

Folder A-4038 describes the CO_2 process and portrays, step-by-step, the method of making cores and molds with sodium silicate-bonded sand. Use of such sand for lining ladles also is covered.—**E. I. Du Pont De Nemours & Co., Grasselli Chemicals Dept.**, Wilmington 98, Del.

For More Details Circle No. 415—Page 169

Drawing Reproduction

Booklet FI-232 tells how reproduction materials can provide short cuts and savings in reproduction departments, drafting rooms, and in the field.—**Graphic Reproduction Div., Eastman Kodak Co.**, Rochester 4, N. Y.

For More Details Circle No. 416—Page 169

Olivine Sand

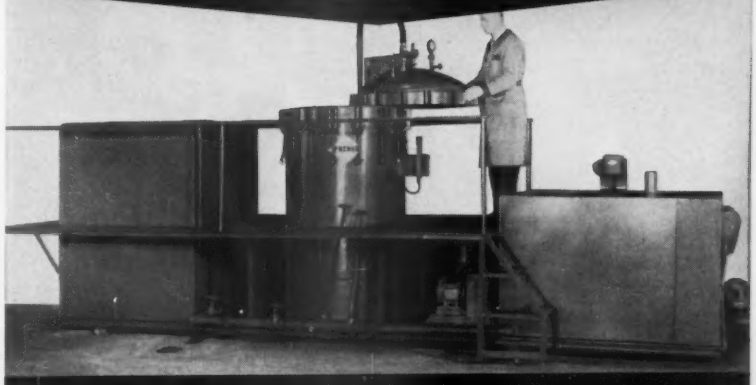
Olivine sand is described, chemical and mineralogical analyses and other properties are listed, and typical molding sand mixtures for nonferrous and ferrous metals are given in Bulletin 100-58.—**Northwest Olivine Co.**, 922 Seaboard Bldg., Seattle, Wash.

For More Details Circle No. 417—Page 169

Hoists and Cranes

End trucks, enclosed conductors, hoists, crane drives and fluid drive motors, trolleys, runway rails,

Lease Equipment Like This



To Impregnate Castings Like These

for a Fraction of a Penny per Pound

Solve all porosity problems in ferrous and non-ferrous castings with *leased* Prenco Impregnation Equipment operating right in your plant. No capital expenditure is necessary. Total cost to you can be as little as a small fraction of a penny per pound of castings treated.

Prenco Equipment, using fast-acting, deep-penetrating Porlox Seal, is production proved . . . widely used by major foundries and die casting plants. Superior results are achieved even with castings of microscopic porosity.

Let Prenco engineers make a complete analysis of your products so that specific recommendations and cost estimates can be made. Mail the coupon below for initial information.

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City_____ Zone_____ State_____

Please send complete information on Prenco Impregnation Equipment. I am interested in

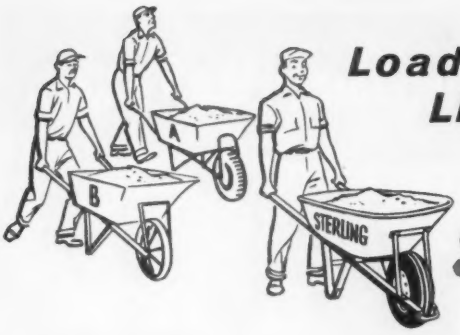
☐ Leasing

☐ Purchasing

☐ Product analysis

F-11

Circle 648 on Page 51



Loads are LIGHTER *with a* **Sterling**

Smooth rolling Sterling barrows, with their scientifically balanced construction, require a minimum of energy. Tests recently completed with three makes of wheelbarrows, each loaded with 320 lbs. of sand, show Sterlings require 40% less vertical force and 60% less horizontal force . . . an amazing performance record. Here are the actual figures:

	Vertical Force Required	Horizontal Force Required
Wheelbarrow "A"	125 lbs.	22 lbs.
Wheelbarrow "B"	128 lbs.	20 lbs.
Sterling Barrow	77 lbs.	8 lbs.

Yes — you SAVE with Sterlings . . . save energy . . . save time . . . save money. Write for catalog.

STERLING NATIONAL INDUSTRIES, Inc.
Milwaukee 14, Wis., U.S.A.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

A8-4525-⅓

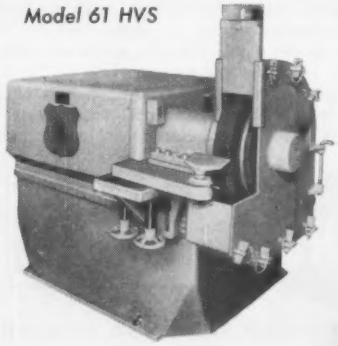
Circle 649 on Page 51

NEW! SAVE MONEY—INCREASE PRODUCTION

Hydraulically Driven
VARI-SPEED SNAGGING GRINDER

NOW—A snagging grinder WITHOUT gears, belts, or adjustable pulley drives.

Model 61 HVS



Brilliant, dependable and economical performance! Constant peripheral speed, regardless of wheel diameter to assure longer wheel life and increased production. Maximum peripheral speed for vitrified or high speed grinding wheels maintained for entire life of wheel AUTOMATICALLY.

- CONSTANT HORSEPOWER
- CONSTANT PERIPHERAL SPEED
- AUTOMATIC WHEEL WEAR ADJUSTMENT

WRITE FOR BULLETIN AND COMPLETE CATALOGS

The United States Electrical Tool Co.
3640 LLEWELLYN ST.,
CINCINNATI 23, OHIO

hanger fittings, and other components for building top riding and underslung cranes from 1 to 15 tons capacity are illustrated and described in Catalog 58A.—**Consolidated Crane & Engineering Corp.**, 767 N. Georgia St., Azusa, Calif.

For More Details Circle No. 418—Page 169

Fans and Blowers

Line of centrifugal, general ventilation, exhauster and axial airfoil fans, turbo pressure blowers, induced draft fans and roof ventila-

tors, is described. Bulletin describes applications and gives size and capacity of each of the fans and blowers.—**Chicago Blower Corp.**, 9867 Pacific Ave., Franklin Park, Ill.

For More Details Circle No. 419—Page 169

Core Sand Mixers

Bulletin A-22 gives specifications and prices on core sand mixers in 2, 4, 6, 8, and 12-cu-ft capacities. A group of letters from satisfied users is shown.—**Muller Machinery Co.**, Metuchen, N. J.

For More Details Circle No. 420—Page 169

Permanent Molds

Bulletin 23 describes and illustrates Meehanite permanent molds used in the production of metal, glass, plastic, and rubber products. —**Meehanite Metal Corp.**, 714 North Ave., New Rochelle, N. Y.

For More Details Circle No. 421—Page 169

Open Motors

Open-type motors suitable for many applications previously requiring enclosed designs are described in Bulletin 05-51B9040.—**Allis-Chalmers Mfg. Co.**, Milwaukee 1, Wis.

For More Details Circle No. 422—Page 169

Magnetic Separator

Bulletin 1051 describes the Indox V drum separator, a new addition to the company's line of ceramic magnet separation equipment. Specifications, dimensions, and a selec-

tion chart that shows the size separator required for a given capacity are included.—**Stearns Magnetic Products,** 635 S. 28th St., Milwaukee 46, Wis.

For More Details Circle No. 423—Page 169

Conveyor Belt

Conveyor belt said to require no breaker fabric is described in Bulletin M302. Pages are arranged to represent a cross section of the belt, and drawings show belt features.—**Manhattan Rubber Div., Raybestos-Manhattan Inc.,** Passaic, N. J.

For More Details Circle No. 424—Page 169

Molding Sand Cooler

Bulletin 594/4 tells what the company's sand cooler is designed to do, explains its working principle, and presents performance data.—**International Automation Corp.,** 121 Huron View Blvd., Ann Arbor, Mich.

For More Details Circle No. 425—Page 169

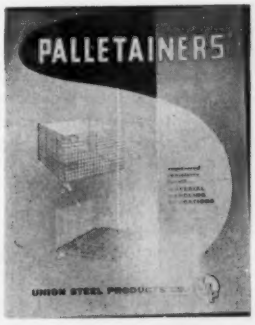
Care of Wire Rope

Red-Strand Service Bulletin 103 describes methods for cleaning, lubricating, and storing wire rope.—**Leschen Wire Rope Div., H. K. Porter Co.,** 2727 Hamilton Ave., St. Louis 12, Mo.

For More Details Circle No. 426—Page 169

Pallet Containers

Brochure 120 gives specifications, capacities, base plans, and side or end gate details for welded rod mesh pallet containers in a broad



range of models. Construction and convenience features are covered, and several photographs show models of the equipment in use.—**Union Steel Products Co.,** Albion, Mich.

For More Details Circle No. 427—Page 169

Air Compressor

Specifications and descriptive data on a 100-hp rotary compressor, delivering 420 cfm at 100 psi, are given in Bulletin E-274.—**Davey Compressor Co.,** Kent, Ohio.

For More Details Circle No. 428—Page 169

Only Westinghouse can offer . . .

SUCH PROMPT INDUCTION MELTING SERVICE WHEREVER YOU ARE!

With 41 Motor and Repair shops and 58 Engineering and Service offices covering every market area, only Westinghouse can offer such prompt, efficient service of induction melting installations all over the country.

Other Advantages of Westinghouse Induction Melting:

- Minimum loss of zinc, chromium or other constituents.
- Minimum absorption of nitrogen and oxygen.
- 1600° to 1700° C attained very rapidly—more heats per hour.
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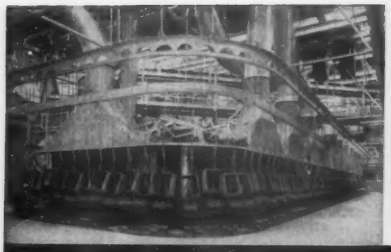
Your Westinghouse representative can show you how to cut costs and improve quality through Westinghouse Induction Melting. Call him or write: Westinghouse Electric Corporation, Industrial Electronics Department, 2519 Wilkens Avenue, Baltimore 3, Maryland. J-35004

YOU CAN BE SURE...IF IT'S Westinghouse

Circle 651 on Page 51

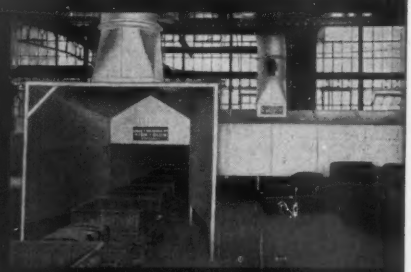


View in new Southern Foundry, shows pouring station with K & B system which removes smoke and fumes as they are formed.

"Shakeouts" in the foundry of a noted implement firm equipped with K & B Dust Control System.

1. DESIGN
2. FABRICATION
3. INSTALLATION

For all three . . . call K&B



K & B Plenum Chamber Hood for mold conveyor operation. Note bolted section construction for ease of maintenance.

For 50 years, Kirk & Blum has specialized in the DESIGN, FABRICATION and INSTALLATION of efficient, dependable systems for the removal of dust and fumes.

DESIGN: Kirk & Blum engineering specialists survey your plant and then design your system, selecting equipment most suitable for your problem.

CONSTRUCTION: Kirk & Blum fabricates the complete system (equipment excepted), "tailor made" for your installation.

INSTALLATION: The Kirk & Blum contract includes responsibility for the entire system, installed by mechanics with years of specialized experience in the installation of such systems. As a result, you have one undivided responsibility—one complete contract for an installed system, ready to operate.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK & BLUM

DUST AND FUME CONTROL SYSTEMS

The Kirk & Blum Mfg. Company, 3108 Forrer Street, Cincinnati 9, Ohio

Obituary

VICTOR A. CROSBY, 65, who was manager of automotive development for the Climax Molybdenum Co., a division of American Metal Climax Inc., Detroit, died Oct. 2. A native of Mississippi and a graduate of the state university there, he joined Climax Molybdenum in 1934 as a metallurgical engineer. Previously he was with Dodge Bros. Co., and Packard Motor Car Co., Detroit, and Studebaker Corp., South Bend, Ind. A past chairman of the Detroit Chapter of the American Foundrymen's Society, in 1951 he received the John A. Penton Medal

VICTOR A. CROSBY

of the AFS for outstanding service to the society and for his contributions to the dissemination of information relating to ferrous foundry metallurgy. Mr. Crosby also was a former chairman of the Detroit Chapter of the American Society for Metals, and a former vice president of the Society of Automotive Engineers.

Philip B. Niles, 56, a vice president and director, Yale & Towne Mfg. Co., New York, died Sept. 24. Mr. Niles joined the company in 1949. Previously he was director of public relations, Owens-Illinois Glass Co., Toledo, Ohio.

Fred J. Boeneker, district representative, A. C. F. Industries Inc., St. Louis, died Sept. 6. He was born and educated in Mexico, and in 1927 joined National Bearing Div., American Brake Shoe Co., St. Louis, where he worked in the export and engineering departments. In 1940 he was named sales engineer, Bronze Alloys Co., St. Louis, and later joined A. C. F. Industries.

Circle 652 on Page 51

NATIONWIDE SERVICE
as and when you need it . . .

Use

CARDOX bulk liquid CO_2 SYSTEM

The original bulk CO_2 system to simplify and streamline carbon dioxide supply and use . . .

- **You have no capital outlay, equipment rental or upkeep cost***
- **Highest purity, moisture-free carbon dioxide**
- **Delivered promptly by the TON in ANY QUANTITY direct to your storage tank from sealed tank car or truck**
- **No in-plant labor or downtime**
- **Simple, dependable, economical**

To get the *most* from the bulk liquid CO_2 handling system, get CARDOX. Hundreds of plants now using CARDOX Bulk Liquid CO_2 will verify this statement! WRITE FOR FULL PARTICULARS TODAY.

CARDOX DRY ICE

is now available in most principal cities

DRY ICE DEPOTS AT:

Boston • Providence • Philadelphia • Jersey City Detroit • Cincinnati • Indianapolis • Milwaukee • Chicago Nashville • Memphis • St. Louis • Fort Worth • Phoenix Los Angeles • San Diego • Oakland

* *Cardox* supplies the CARDOX Low Pressure Storage Tank, installs the System and maintains it for you. Based upon reasonable consumption requirements, all you pay for is the CARDOX CO_2 you *actually use*, at the low rates established in your contract. Prompt CO_2 delivery *always* from principal cities.

CARDOX CORPORATION

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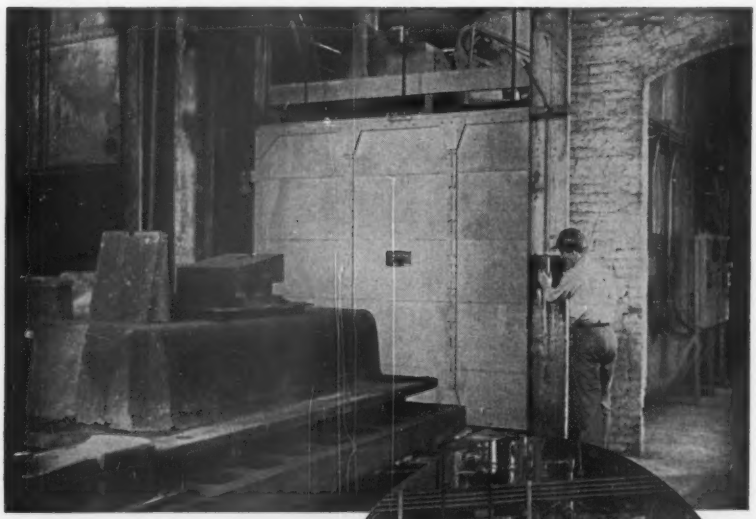
Liquid CO_2 Supply Depots at: Boston, Mass.; Jersey City, N.J.; Philadelphia, Penna.; Suffolk, Va.; Cabin Creek, W. Va.; Barberton, Ohio; Detroit, Mich.; Cincinnati, Ohio; Chicago, Ill.; Memphis, Tenn.; St. Louis, Mo.; Tampa, Fla.; Ft. Worth, Tex.; Phoenix, Ariz.; Los Angeles, Calif.; San Diego, Calif.; Oakland, Calif.

MANUFACTURERS OF: Carbon Dioxide Fire Extinguishing Systems • Foam Fire Equipment • Liquid Carbon Dioxide • Dry Ice • Airdox and Cardox Mining Methods • Auger Miners • Augers and Bits • Central Compression Systems for Air, Helium, etc.

Circle 633 on Page 51

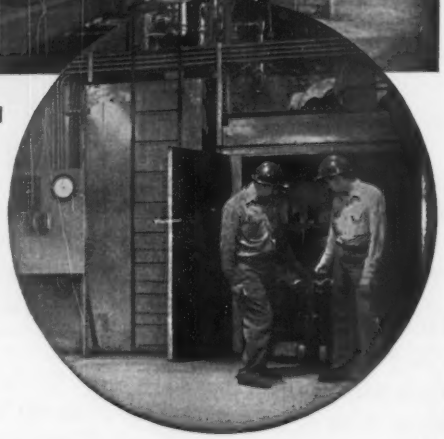
here's another **carl mayer** installation...

Cutting Costs for its Owner



CAR TYPE CORE AND MOLD OVEN

Above—A difficult engineering and installation problem solved by Carl Mayer because the oven filled this space completely. This modern oven, with patented down draft heating system and motor operated lift door, replaced an obsolete brick oven.



RACK TYPE CORE OVEN

Right—Installed at rear of mold oven to form an efficient, flexible combination. Miscellaneous cores are uniformly baked with modern, automatic controls. Operation is efficient and economical.

Carl Mayer's outstanding engineering and design features sold the steel mill where these ovens are now in operation. They incorporate the exclusive Carl Mayer recirculating heating system and special triple slotted panel construction.

Heat loss is reduced up to 1/3, and fuel savings up to 50% over old conventional methods are possible. Temperature uniformity is guaranteed.

Consult Carl Mayer now for any type foundry oven or furnace, large or small, and for any purpose. Write for Bulletin 53-CM.

THE **carl mayer** CORP.

20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

Mr. Boeneker was a former chairman of the St. Louis Chapter of the AFS.

George W. Wilder, 63, general manager, Stewart Die Casting Div., Stewart Warner Co., Bridgeport. Conn., died Sept. 6.

Jess R. Lytle, 77, former master mechanic and chief electrician, Vulcan Mold & Iron Co., Latrobe, Pa., died Sept. 16. He retired in 1954.

J. E. Carroll, president, G. & C. Foundry Co., Sandusky, Ohio, died Sept. 8.

Booklet Lists Changes in Mild Steel Electrode Specification

Changes in the specification for mild steel electrodes are contained in a booklet "Specification for Mild Steel Arc Welding Electrodes" prepared by the American Welding Society and the American Society for Testing Materials.

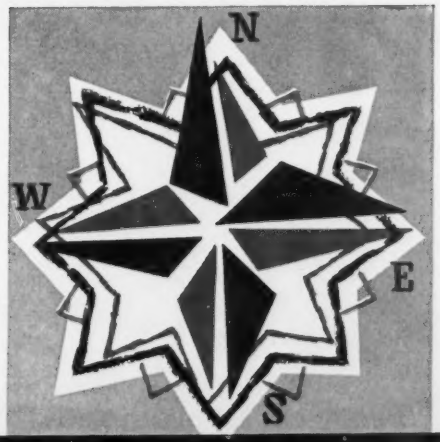
Major changes include three new iron powder electrodes, two of which are low hydrogen electrodes, a new E70 mild steel classification containing six electrode types, the listing of certain electrodes in the E70 series as well as the E60 series, the necessity that certain electrodes must meet chemical requirements to ensure deposition of mild steel weld metal, and inclusion of tables showing mechanical properties to be expected in the as-welded condition and giving a comparison of current ranges.

The booklet may be obtained from the technical department, American Welding Society, 33 W. 39th St., New York 18, for 50 cents.

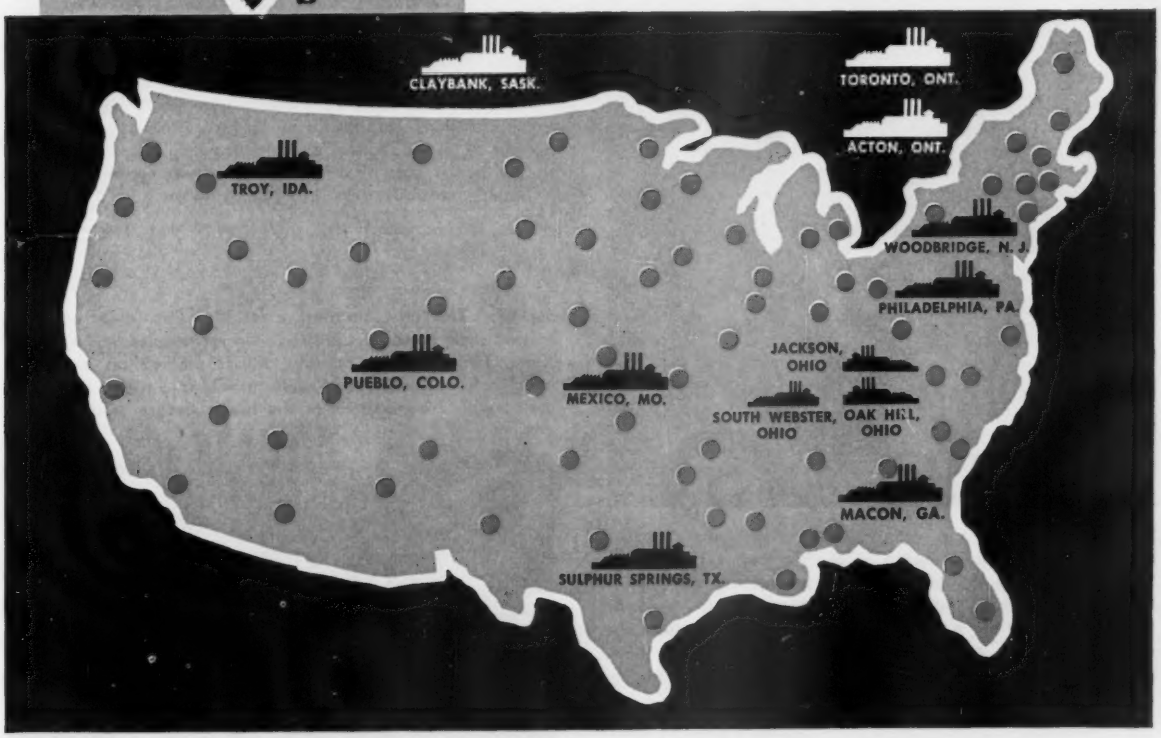
Metal Treating Institute Makes Achievement Award

Michael P. Rivera, senior engineer, Vacuum Equipment Div., New York Air Brake Co., Camden, N. J., received this year's Metal Treating Institute Annual Achievement Award. The winner of this award is selected from authors of articles published in *Metal Treating* magazine or from speakers at the 1957 annual fall meeting or the 1958 spring meeting of the institute.

Mr. Rivera received the award for his article, "Special Techniques in Vacuum Metallurgy," published in two parts in the November-December, 1957, issue and the January-February, 1958, issue.



A. P. GREEN PLANTS and warehouse stocks conveniently located to save you down time and shipping costs



Manufacturing Plants

Warehouse stocks in principal cities

Your A. P. Green Distributor is Listed In The Yellow Pages of Your Telephone Directory, or write:

A. P. GREEN FIRE BRICK COMPANY
Mexico, Missouri, U. S. A.

A. P. Green REFRACTORY PRODUCTS

PLANTS: Mexico, Mo. — Woodbridge, N. J. — Sulphur Springs, Texas — Jackson, Oak Hill, South Webster, Ohio — Philadelphia, Pa. — Troy, Idaho — Pueblo, Colo. — Macon, Ga.

IN CANADA:
A. P. Green Fire Brick Company, Ltd., Toronto 15, Ontario.

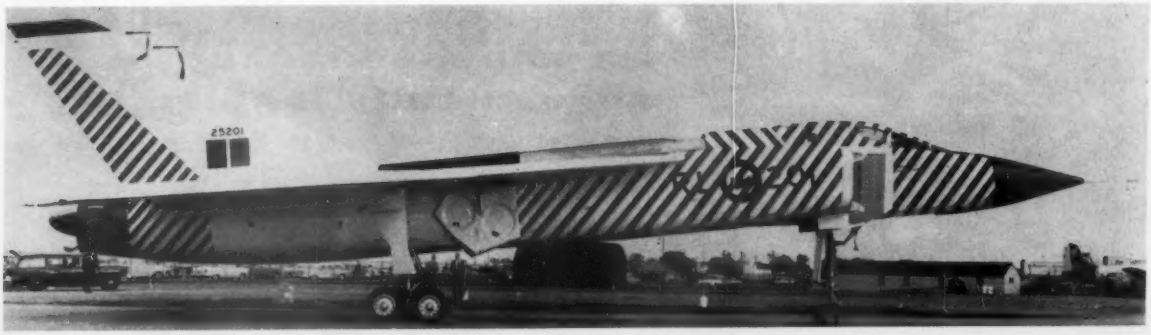
13 A. P. Green manufacturing plants and warehouse stocks conveniently located throughout the United States and Canada, Save You Money 7 Ways.

- Lower Shipping Costs . . . from nearby manufacturing or warehouse point.
- Lower Capital Investment . . . your capital is not tied up in warehouse space.
- Lower Inventory Costs . . . you need inventory only for *immediate* needs.
- Lower Inventory Losses . . . buy on current prices . . . less breakage while in storage.
- Increase Production Space . . . free storage space for profitable production.
- Lower Labor Costs . . . deliveries to point of usage . . . no inplant moving of stocks.
- Maintain Steady Production . . . reduce down time waiting for materials.

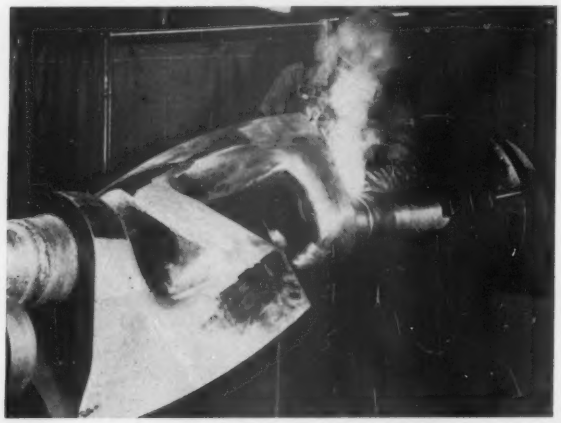
Distributors In The Principal Cities of the World

Circle 655 on Page 51

News Views

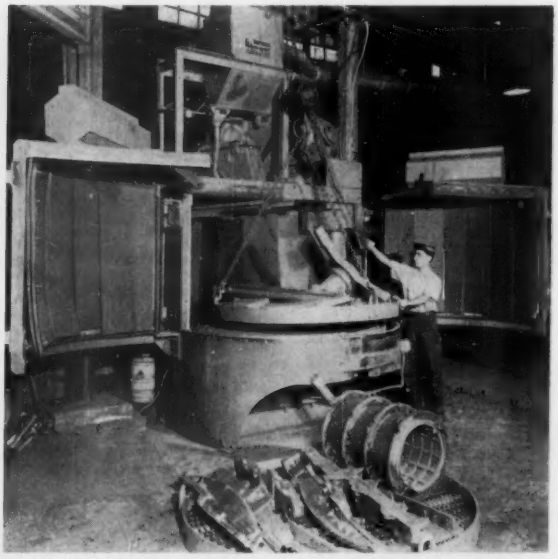


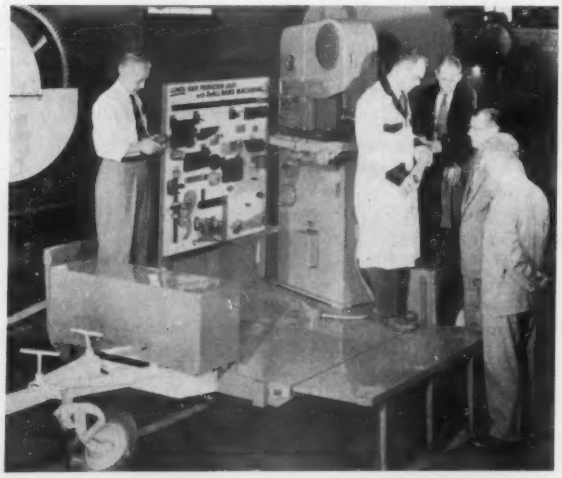
CANADIAN FIGHTER: Extensive use of magnesium castings in the engines contributes to a record ratio of thrust to weight in Canada's new CF-105 Arrow fighter, according to Avro Aircraft Ltd., the builder. The two engines develop 5 pounds of thrust for each pound of weight.



SPEEDY CLEANING: Utilizing a double pallet system for handling castings in blast cleaning operations, the Bonnot Co., Canton, Ohio, has speeded output of its Pangborn table room. While one pallet load is being cleaned, the operator loads a second pallet. This eliminates the time the operator would spend waiting for the machine to finish a cycle before emptying and reloading it.

MIXER: This cast stainless steel blade is to be used in mixing rocket and missile fuels. To weld axles to the blade, Baker Perkins Inc., Saginaw, Mich., utilized an old lathe chuck and variable speed drive to hold and rotate the work. Axles were shrink-fitted to the blade before welding.





PROOF ON THE JOB: As part of its program to demonstrate the increased productivity of its machines, the DoAll Co. has mounted new models on trailers that can be taken into customers' plants. Using actual jobs, the machines are demonstrated under existing shop conditions.

High-speed Sodium Silicate-CO_2 process is used for making molds for hangar-door counterweights at St. Paul Foundry and Manufacturing Co., St. Paul, Minn. In this "book" molding operation, 30 parts are made with one pour in clamping jacket (*above right*).

These 4 men make 680 rigid, accurate molds in 6 hours with the

SODIUM SILICATE-CO_2 process

Greatly increased production of grey iron castings at the St. Paul Foundry and Manufacturing Co. is credited to the sodium silicate-CO_2 process. The binder used is Archer-Daniels-Midland's "Adcosil," based on Du Pont Sodium Silicate; CO_2 is the curing agent.

Curing takes so little time that 4 men turn out 680 accurate molds in 6 hours for 20 tons of poured metal! Other processes—like green-sand molding—require up to 12 men, yet still can't match CO_2 output. St. Paul Foundry workers prefer CO_2 molding because there are no objectionable fumes. Management likes the extremely close tolerances of the molds—possible because the sand hardens while in *direct contact with the pattern.*

Perhaps your operation can profit with the sodium silicate-CO_2 process, just as the St. Paul Foundry does. Ask your foundry supplier for full details about this timesaving process, or write to Du Pont for names of suppliers of binders based on Du Pont sodium silicate.

E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Rm. N-2533, Wilmington 98, Delaware.

DU PONT SODIUM SILICATE

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

CORE BLOWER forces sand into pattern mold, forming an exact duplicate. St. Paul uses mixture of sand and "Adcosil," a binder made by Archer-Daniels-Midland, Cleveland, Ohio.

HARDENED IN SECONDS—12-second CO_2 gassing reacts with sodium silicate to harden mold while still in pattern. Cured mold won't crack when lifted, is rigid enough to stand on edge without damage.

NO COSTLY SET-UP EQUIPMENT—Molds are placed in clamping jacket for metal pouring. Castings cool overnight. Next morning "books" are shaken out, and jackets made ready for next pouring.

Hot investment mold is removed from the furnace prior to placement in a vertical sling centrifuge for casting

Joan Castle Joseff shows a citation for her work as a foundry owner. A number of business groups have honored her

Jewelry Foundry Turns to Military Investment Castings

By THOMAS A. DICKINSON

IN ADDITION to being one of the largest investment casting foundries in southern California, Joseff-Hollywood, Burbank, Calif., is unusual for many reasons. Not the least of them is its owner, Joan Castle Joseff whose attractive appearance is camouflage for a successful business executive.

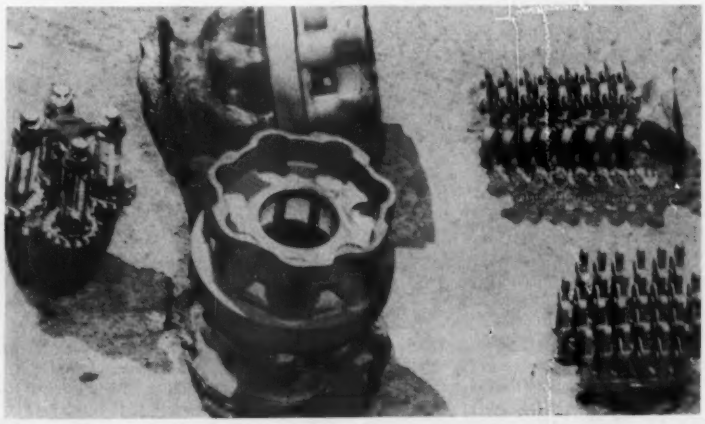
The company is notable as the producer of much of the costume jewelry seen in American-made motion pictures and television dramas, but for some time almost 90 per cent of its output has been for the aircraft and missile industries.

Despite the 1958 recession, its 12,000-sq-ft plant provides employment for 110 workers—almost 20 times the number on its payroll in the boom year of 1948, when Eugene Joseff, its founder, was killed in an airplane accident.

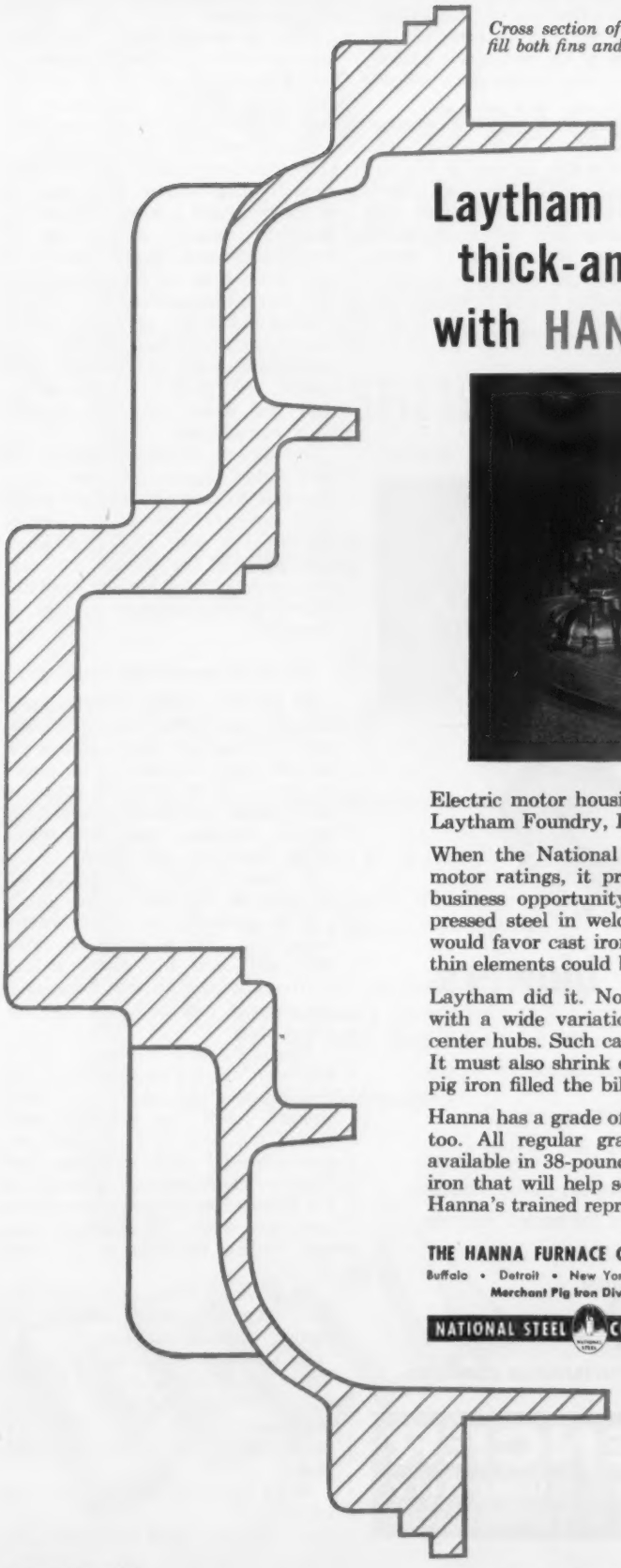
A former New York advertising man who once made costume jewelry as a hobby, Eugene Joseff was among the many almost penniless residents of Hollywood in the early 1930s when he learned that there was an unsatisfied demand for specialized ornaments among movie producers.

The demand was so great and

Eugene Joseff, company founder, is shown with some of the more ornate props the company made for movie producers



A group of typical company investment castings prior to cleanup work



Cross section of motor cover casting shows how iron must fill both fins and center hub to solve heat diffusion problem.

Laytham casts complex thick-and-thin motor housings with HANNA PIG IRON

Electric motor housings today are a large volume item produced by Laytham Foundry, Inc., Paterson, New Jersey.

When the National Electrical Manufacturers Association raised its motor ratings, it presented Laytham with a challenge—and a new business opportunity. Where many former housings were made of pressed steel in welded sections, the need for greater heat diffusion would favor cast iron, providing the proper combination of thick and thin elements could be achieved.

Laytham did it. Now they regularly produce motor frame castings with a wide variation in section thickness from thin fins to heavy center hubs. Such castings require iron with a high degree of fluidity. It must also shrink evenly and be free of porosity. Hanna Malleable pig iron filled the bill perfectly.

Hanna has a grade of high-quality pig iron to meet your requirements, too. All regular grades, plus HannaTite and Hanna Silvery, are available in 38-pound pigs and the smaller HannaTen ingots. For pig iron that will help solve your metallurgical problems, call on one of Hanna's trained representatives.

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION

Circle 657 on Page 51

the competition so insignificant that Joseff, a craftsman who never had much respect for sound business practice, was able to become a successful jewelry manufacturer despite shoestring capitalization.

Shortly before the start of World War II, he expanded his business by producing jewelry for retail stores as well as for motion picture studios. Then, over a period of many months, he was perplexed to find he was losing money.

His secretary—fresh out of business college—finally told him why: He was selling jewelry to retailers for less than the cost of production. Impressed by this obvious bit of logic he took his secretary's advice to cut costs and revise price schedules.

The advice was sound, and the secretary—Joan Castle—soon became Joseff's wife as well as his office manager. The resultant combination of business knowhow and craftsmanship paid handsome dividends during World War II, when Joseff-Hollywood made many thousands of dollars worth of investment castings for aircraft and armament manufacturers.

Due to excess profit taxes and postwar contract slashes, however, at the time of Joseff's death in 1948, the company was financially almost to the point where it started.

Mrs. Joseff, or "J. C.," as she is known to her friends and associates, virtually had retired from business in 1947 to have a baby. When she suddenly became sole owner of Joseff-Hollywood, many thought it was better than an even-money bet that the business could not survive.

After all, the skeptics asked, wasn't the movie industry her only immediate source of revenue? And wasn't it Joseff's craftsmanship that had made the movie people good customers?

By hiring skilled designers and minimizing costs, J. C. not only was able to keep the business going with returns from motion picture makers, but also landed a king-sized share of the aircraft and missile contracts that became available following the outbreak of war in Korea.

Produces Investment Castings

At present, Joseff-Hollywood produces about 18,000 investment castings a month. They range in weight from a fraction of an ounce to about 12 lb and are made in such varied materials as beryllium copper, stainless steel, aluminum, silver, platinum, and brass.

In many respects, production advantages of this foundry are attributable primarily to its relatively large size. For example, it probably pays less for metal tooling than many competitors because it has its own tool designers and machine shop.

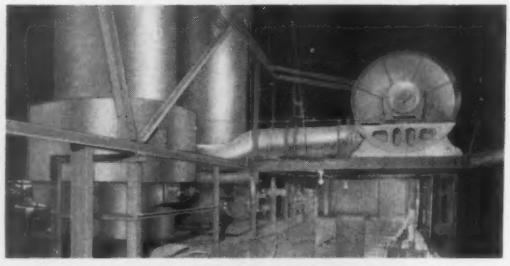
However, the company always has been notably progressive in the development and use of new ideas. Eugene Joseff, for instance, originated the formula for a wax pattern material with shrinkage and burnout characteristics suitable for the fabrication of close-tolerance investment molds. The company also was among the first to do these things:

1. To make heat and impact-resistant ceramic molds suitable for casting stainless steels.
2. To degas molds in a vacuum while being mechanically vibrated.
3. To use induction heating equipment to melt metals with maximum speed and minimum oxidation.
4. To fill molds with vertical sling centrifuges.

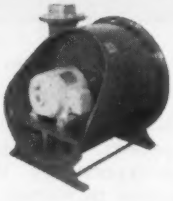
At present, Joseff-Hollywood en-

VITAL *to any foundry*

...a healthy heart



...and strong lungs



reliable SPENCER blowers

When lungs fail, the heart stops. So, too, the cupola—"heart" of any foundry—must have *dependable* air supply.

That's why—where air delivery *must not fail*—you'll invariably find SPENCER blowers.

They have been first choice of leading cupola manufacturers and foundrymen for fifty years . . . and for sound reasons, including . . .

- SIMPLE, RUGGED DESIGN
- LOW MAINTENANCE
- RELIABLE OPERATION
- ACCURATE AND INSTANTANEOUS CONTROL

Request Bulletin 112-B.

ALSO MANUFACTURERS OF INDUSTRIAL PORTABLE VACUUM CLEANERS.

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

NOW... YOU GET SMOOTHER... STRONGER SHELL CORES

(ANY TYPE SAND)

WITH

AMAZING...NEW DELTA SHELLKOAT FM WASH

Note how Delta ShellKoat FM Wash anchors itself to the surface by penetrating from 6 to 10 grains deep. This eliminates the possibility of sand errosion or burn-in and insures smooth casting surfaces.

NOTE THESE ADDED ADVANTAGES:

- ✓ PLASTIC TYPE WASH — mix with water to necessary Baume.
- ✓ Coating is uniformly bonded and equally as smooth after hot or cold dipping (70°F to 450°F).
- ✓ Highly Refractory
- ✓ No Runs
- ✓ No Buildups
- ✓ Washed surface is inert to molten metal.
- ✓ May also be used, with equal advantages, in coating conventional oil-sand cores.

...and IT'S ECONOMICAL TO USE!

DELTA

Ask for a Sample...

Working samples and additional information on Delta ShellKoat FM Wash will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CORP.
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

Circle 659 on Page 51

PATCH AND PLACE UP TO 5000 LBS. OF REFRACTORY MATERIAL AN HOUR WITH THE "CEMENT GUN"®

Your own men can learn to operate the "CEMENT GUN" quickly and easily. After that, two or three of them can make all your cupola and ladle repairs in quick time. Using the "CEMENT GUN," they can place a lining 1" to 6" thick in one continuous operation, placing as much as 5000 lbs. of refractory material an hour. Write today for special FREE bulletin describing the "CEMENT GUN," its operation, prices, etc.

CEMENT GUN COMPANY
"GUNITE"® CONTRACTORS
1520 Walnut St. Allentown, Pa.

Circle 660 on Page 51

MINIMIZE BURN-OUT...

PSC's All-Sheet Construction Adds to Furnace Tube Life

Experience of users shows much lower frequency of burn-out, with tube life extended up to 100%. In PSC tubes, precision-welded bends are of same metal and thickness as the legs. The continuously smooth walls result in uniform flow of gas, and reduce the carbon build-up and bend burn-out, which commonly result from the rough interiors of cast alloy bends. Lighter than cast by 33 to 50%, PSC radiant tubes cost less initially. Any size, shape or alloy.

Send for Heat-Treat Catalog

THE PRESSED STEEL CO. • Wilkes-Barre, Pa.

Circle 661 on Page 51

gineers are working on a vacuum-heating setup which is expected to permit the investment casting of titanium.

In its work for motion pictures and television producers, the company is able to fill many orders without manufacturing anything. Over a period of many years, it has accumulated a large stock of costume jewelry that is needed often enough to be profitable on a rental basis. Some custom work also still is done—for example, to accommodate individual stars who need special types of jewelry to conceal unsightly blemishes.

Costume jewelry for retailers is not a major item on Joseff-Hollywood's production schedule at present. Since it is sold through some of the more exclusive stores, where the best prices are obtainable, however, it accounts for substantial profits.

National Foundry Association Meets in Chicago Nov. 20-21

National Foundry Association will hold its 60th annual meeting Nov. 20-21 at the Drake Hotel, Chicago. The program, listed below, will feature case studies of foundry programs in the areas of collective bargaining and employee relations, including safety and communications.

Labor Negotiations in the Foundry Industry—1959. Charles T. Sheehan, NFA executive secretary, will take a look at what 1959 holds, basing his report on settlements in 1958 and on serious demands made and withdrawn by the unions in this recession year.

Rising Workmen's Compensation Costs—A Continuing Puzzle. D. F. Stevenson, attorney-at-law, will summarize causes for rising workmen's compensation costs despite reduced injury rates and present a positive program for coping with that paradox.

Economic Conditions and Business Prospects. John K. Langum, Business Economics Inc., will view the short and long-term business prospects with emphasis on the metalworking industry.

Cost Savings Improvements in Labor Agreements, a panel session. James Ansberry, Madison Foundry Co.; D. Russell Gochnour, Marion Power Shovel Co.; Charles Outman, Hansell-Elcock Co., and H. R. Williams, Williams Management Engineering Co., will discuss the costliness of loosely-worded provisions in the nonwage items, and how these pitfalls may be avoided in negotiating your next labor agreement.

A Successful Foundry Safety Program. W. G. Greenlee, Greenlee Foundries, will describe a simple, effective plan adaptable to most foundries.

An Effective Communications Program. Allen V. Slichter, Pelton Steel Castings Co., will relate his firm's success in using various methods and media to make its philosophy a living thing with its employees.

Management Development and Training. Carl V. Brick, Borg-Warner Corp., will discuss basic fundamentals used by his company to develop and train personnel at all levels of the management team.

China and Communism. Rev. Frederick Becka, M.M., a missionary in China for seven years, will recount Communist China's methods of operation and organization.

FOR CLARK BROS. CO. MANIFOLD CASTINGS

Use of Kold-Set provides smoother casting surfaces, together with dramatic cost savings, for Clark Bros. Co. in production of manifolds for R A Type Compressors.

Core: Bed-in sand and driers are not needed. The cores retain excellent dimensional accuracy.

Core Setting: Conventional methods require one core setting for fitting, as well as a re-setting. Only a single setting is needed with Kold-Set.

A good deal of core rubbing has been eliminated and there is no bed-in sand to remove. This results in a better core surface while lessening the chance of loose bed-in sand causing dirt in the casting.

Casting and Cleaning: Casting surfaces are smoother due to eliminaton of bed-in sand. Hydro-blast time has been reduced by 50%, and there is less finish chipping. Due to superior venting in the Kold-Set sand mix and less gas potential in the cores after baking, blows in the cope of the casting have been eliminated.

Get the facts on Kold-Set. Ask for Technical Bulletins

KOLD-SET®

THE ORIGINAL COLD-SETTING BINDER

G. E. SMITH, INC.

246 Washington Road, Pittsburgh 16, Pa.

ORIGINAL AND EXCLUSIVE MANUFACTURERS OF THE KOLD-SET PROCESS IN THE UNITED STATES

Circle 630 on Page 51

Highest Quality

Priced Right

Personalized Service

BERKSHIRE

• Zircon Sand

• Zircon Flour

• Silica

• Bentonite

At our fully-stocked warehouses located strategically throughout the country we carry large stocks ready for fast delivery to you. Just tell us what you need—and when—and leave the rest to us. We're anxious to prove to you what Berkshire service means. Contact your local Berkshire representative or write for complete details.

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Circle 663 on Page 51

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Using Sand Data"

DURING my younger, more impressionable days, I looked on all librarians with a mild disrespect. To me, they were either long-haired men or short-haired women. They wore pince-nez glasses and sat behind immaculate desks, measuring others with an ominous expression and sternly "shushing" them if they dared even to cough slightly.

They were people who seemed to be semiretired to that sequestered position, either because of age or of inability to fit in anywhere else. For my generation, the average library was a place to be shunned studiously. Only an extreme emergency or the threat of punishment could induce us to enter its forbidding portals!

Times Have Changed—I am happy to report that times have changed. Today's libraries and librarians no longer frighten little children. Librarians have ceased to be ogres and have become very acceptable people. Most of them go out of their way to help one find the book or information he seeks. They even have acquired a cheerful aspect, and I am told that dogs and cats no longer run from them.

I'm sure you won't believe this, but I know a couple of librarians who are reasonably young, smoke cigarettes, take an occasional cocktail, and can tell a risque story. Yes indeedy, times have changed!

Today's librarian is young in heart and mind. He or she not only is a college graduate, but has engaged in postgraduate activity so extensive that it should qualify him or her for a doctor's degree. The postgraduate course in librarianship covers so many phases of book knowledge that I hesitate to expose my ignorance by attempting to enumerate them. Suffice to say that today's librarian is a specialist of note and ranks equally with our educators.

Research always has been difficult and frequently is disappointing. It would be immeasurably more difficult if there were no librarians. Hence, this feeble tribute to our bibliophiles.

The constantly expanding technical library at the headquarters of the American Foundrymen's Society is one indication of the importance of recorded and classified information. We also have the voluminous files of FOUNDRY, dating from 1892 to the present. All of this carefully preserved and indexed material is at the service of any interested and responsible person, and its value is inestimable.

Recording Is Modern—It is only in comparatively recent years that foundrymen have seen fit to keep records of the technical details of their *modus operandi*. Today, in most shops, the superintendent has card-indexed material relating to his melting procedure, sand mixes, pattern layout, and other phases of his foundry practice. Fifty years ago, the general run of foundrymen made few written records; their methods were secret and were preserved imperfectly in their jealous craniums. (Benvenuto Cellini was an early notable exception in that he recorded his "Treatises" for posterity.)

The modern library, with its unending stacks of immaculately arranged books, its complicated system of purchase and distribution, its innumerable and multiservice indexes, and its talented and charming custodians, was neither invented nor discovered, but like other achievements of man, is a product of evolution. (It probably all was started back in the Stone Age, or soon after, by some enterprising,

TOCCO* Induction Heating

melts bronze aluminum and stainless steel for high-precision, porous-free castings

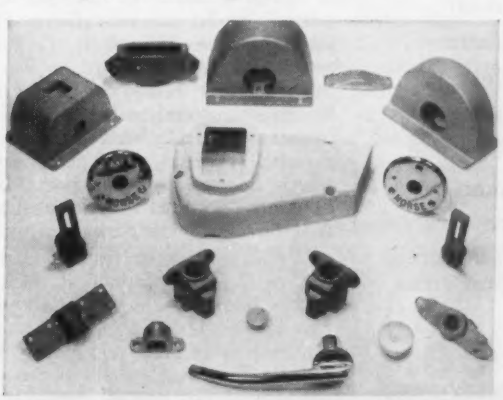
Morse Instrument Company, Hudson, Ohio, manufacturer of marine hardware and control instruments, recently switched from conventional furnaces to TOCCO Induction Melting. Results: greater speed, better working conditions and, above all, purer, sounder castings.

"Castings are free from porosity since we switched to TOCCO Induction Melting," reports president John Morse. "This is a sales advantage to us and a tremendous quality advantage for our customers."

Whether you're interested in melting ferrous or nonferrous metals, TOCCO Induction Melting offers you these important advantages:

- Stepless Power Control
- Extremely Rapid Melting
- High Efficiency—Even on Intermittent Operation
- Good mixing because of Natural Agitation
- Extremely Low Alloy Loss
- No Contamination when Composition of Charges is Changed
- High Reproducibility of Results
- Minimum Space Requirements
- No Special Installation Charge
- Simple, Safe Operation
- Clean, Comfortable Working Conditions
- No Carbon Pick-up

If any of these advantages suggest economies in your operations, write for full details—no obligation, of course.



Sample castings produced by Morse Instrument Company with new shell molding process and TOCCO Induction Melting.

THE OHIO CRANKSHAFT COMPANY

Mail Coupon Today— NEW FREE Bulletin

The Ohio Crankshaft Co. • Dept. F-11, Cleveland 5, Ohio

Please send copy of "The Case for TOCCO Induction Melting".

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Circle 664 on Page 51

SAVE

WITH *Acme*

MELTING POTS
INGOT MOLDS

Designed by
FOUNDRYMEN...
for FOUNDRYMEN

You'll find it pays to standardize on Acme melting pots and ingot molds. They reduce down time and replacement costs because they're cast from a special iron formula that combines strength with high temperature resistance. They improve quality and reduce rejects, too, because they're designed for even heat distribution without hot spots. If you melt any non-ferrous metals, take advantage of our more than 30 years' experience in this field. It's your assurance of consistent high quality in Acme melting pots and ingot molds . . . designed *by* foundrymen, *for* foundrymen.

Quick delivery anywhere in the United States.
Write for size list showing 40 standard sizes.

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apelike creature who simply wanted to preserve his toys and weapons and devised an empirical method of hiding things where he hoped he could find them again. Being unable to decipher an Egyptian hieroglyphic, I have avoided such an assignment, but I'm reasonably sure that even these ancient chiselers were laying the groundwork (no pun intended) for our future historians and librarians.

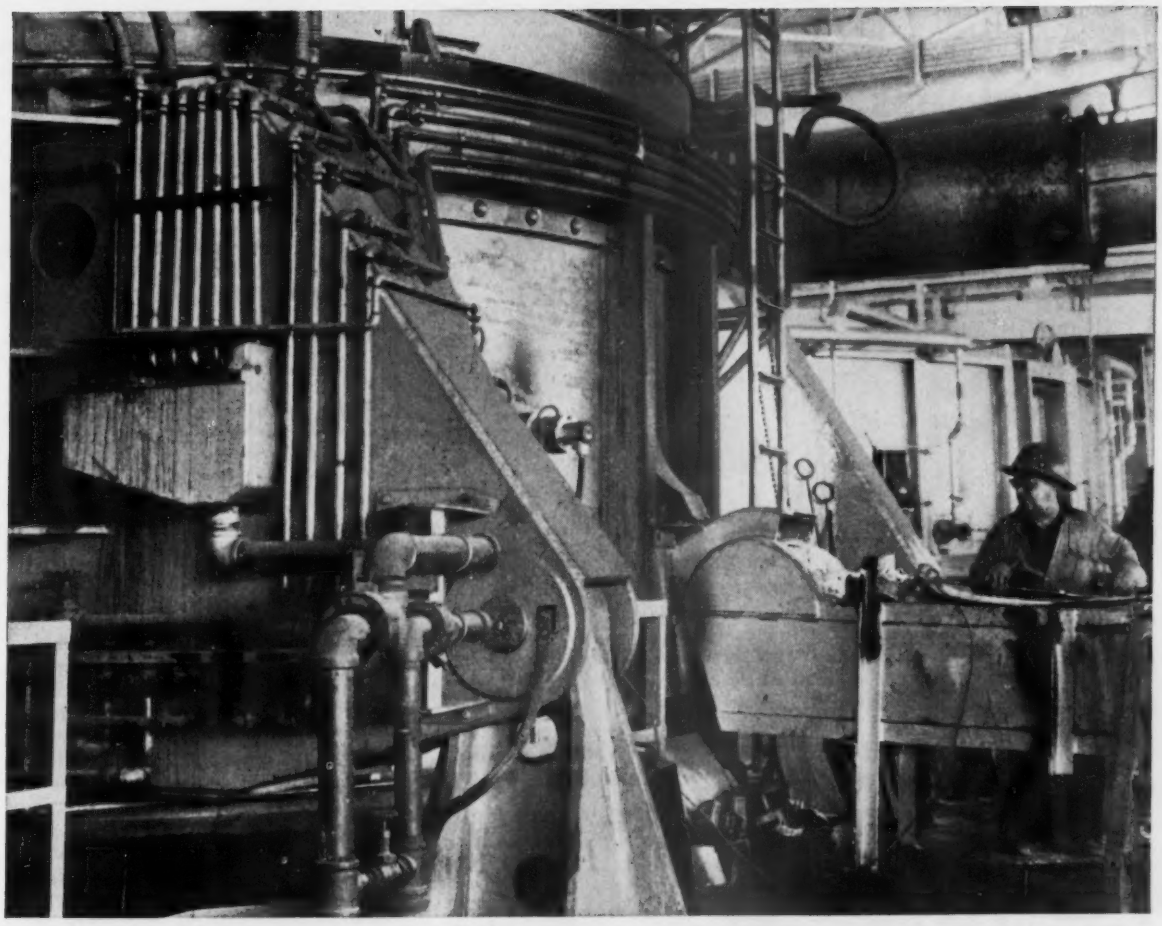
Foundrymen today not only file all information pertinent to their operations, but some of them keep duplicates, triplicates, and even sextuplicates. This habit reminds me of the Sam Goldwyn story in which it was said that Mr. Goldwyn insisted on the filing of multiple copies of even the most trivial material. His secretary finally protested, "Mr. Goldwyn, our filing cabinets are bulging, and we haven't room for more cabinets. Why don't we destroy a few tons of this worthless paper?"—Goldwyn wrinkled his brow for a few moments, then brightened perceptibly. "Miss Richmond, you're absolutely right!" he said. "Burn the stuff! But first, be sure that you make carbon copies of everything!"

In "filing," as in almost everything else, the exercise of judgment determines its value. Records in themselves are of no earthly use unless someone, now or in the future, is going to use them.

They're Never Needed—Most of us are familiar with the type of sand technician who keeps his laboratory as neat as a pin, makes sand tests hourly or more often, and in the nicest of penmanship (or typing) records all of his findings on little white cards, to be carefully filed for immediate use when needed. The deplorable fact is that they *never* are needed. They might just as well be entombed in Fort Knox.

This boy has brains, and he may be doing a beautiful job, but the fruit of his labor never ripens. His best efforts are ignored by the very people he is supposed to be working for. His laboratory and the foundry sand system belong to different worlds. His tests may reveal definite excesses or deficiencies which he records and reports, but he is not permitted to order changes that obviously are desirable.

We clearly recognize the imperative need for departmental responsibility but we seldom stipulate precise boundaries of authority. If we do, they frequently are more honored in the breach than in the observance. From general manager to janitor, overlapping authority de-



From the World's Largest Copper-Melting Electric Furnace

TOP QUALITY CASTINGS... ROCK BOTTOM COSTS

Whiting Hydro-Arc Electric Furnace at the Perth Amboy, N. J. plant of American Smelting and Refining Company pours a ton of copper every two minutes—24 hours a day, 7 days a week. Operating costs are competitive, even in this area of high-priced electric power.

Hydro-Arc offers you the *precise* temperature control that assures a top quality product—be it copper, iron, steel, or any other metal or material. You will save money, too, because continuous melting boosts production . . . top-charging reduces downtime . . . simplified design cuts maintenance costs . . . and Hydro-Arc costs less installed than other equipment of equal capacity. For prime melting or duplexing get the facts on Hydro-Arc.

SEND FOR NEW 8-PAGE BULLETIN EF-100

telling all about the electrode arm and clamp which floats on a cushion of air and which is clamped by a cushion of air. Booklet is fully illustrated. *Whiting Corporation, 15607 Lathrop Avenue, Harvey, Illinois.*

Member of the Foundry Equipment Manufacturers Association

87 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

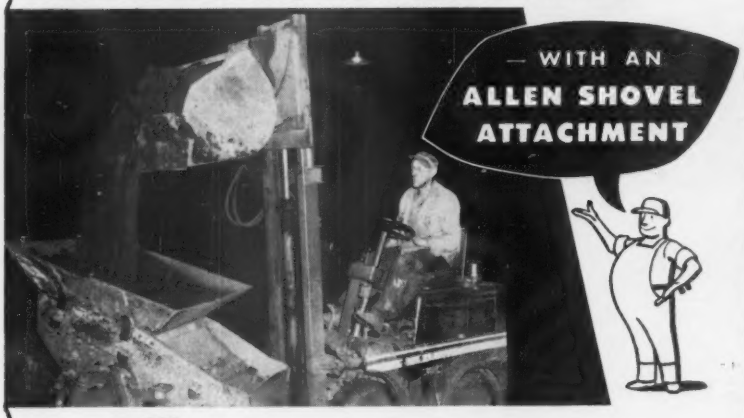
WHITING

FOUNDRY EQUIPMENT

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILE; FOUNDRY, RAILROAD AND CHEMICAL PROCESSING EQUIPMENT

Circle 666 on Page 51

How to boost lift truck usefulness, cut idle time



When fast-moving lift trucks work themselves into idle time, you can quickly replace forks with an Allen shovel and handle loader chores around the plant. It takes less than 15 minutes to install the Allen shovel and add bulk material handling ability to any major make of lift truck. Write for detailed literature — specify make and model of lift truck.

ALLEN INDUSTRIAL PRODUCTS INC.
318-K Pilgrim Road • Menomonee Falls (Milwaukee District) Wisconsin

Circle 667 on Page 51

CHILL KOOLHEAD NAILS

You can rely on "KOOLHEAD" and "STANHO" products

Chill Nails and Spiders

for...
ACCURATELY CONTROLLED FOUNDRY CHILLING

Write for samples and prices

Choose any style from Jumbo to Stubby; slim, medium or horse nail blade; blunt, pointed, straight or 90° bent. There's a type and size Koolhead Chill Nail or Spider Chill to do your specific chill job best.

STEEL Stanho PRODUCTS

the Quality Line

- WOODRUFF KEYS
- MACHINE KEYS
- MACHINE RACK
- TAPER PINS
- COTTER PINS
- SPECIAL PARTS

and other Stanho products Bulk or Packaged

WRITE for CATALOG and PRICES

STANDARD HORSE NAIL CORP.
Since 1872 NEW BRIGHTON, PA

Circle 668 on Page 51

fies definition, and its exercise produces much "bad blood" between departments. In this field of human relations, we have a challenge worthy of our best brains.

A Member of the Team—I am not, by these comments, recommending or even suggesting that the sand technician should go over the foreman's or superintendent's head in attempting to prescribe the various mixes required in the day's operations. But I do believe that he is a partner in this working team. When sand trouble is evident, he should be consulted respectfully, not insulted by a dictatorial insistence on a radical change of sand properties which invariably produces more trouble than it cures.

After all, he supposedly is the one man in the shop especially qualified to deal with sand problems. Why not let him function in that capacity, rather than remain a mere custodian of meaningless records on little white cards? These cards were intended to be a living, growing report on past and present practice. They record success and failure, decline or growth, and should serve the foundryman as a patient's chart serves a doctor.

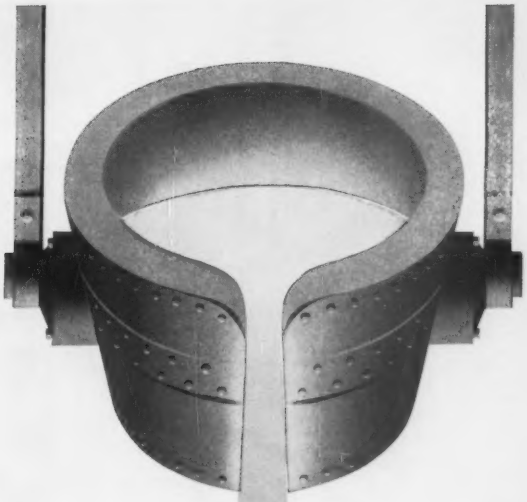
These records can become a case history and may indicate the value of ingredients used to develop desirable sand properties. Properly used, they become a gold mine of information. Neglected, they not only are valueless, but represent a deplorable waste of human effort and dignity that might otherwise prove valuable. I have no doubt that much of our past and present sand failure can be traced directly to this lack of co-ordination between the foundry and the laboratory.

British Iron Castings Output Down, Automotive Needs Up

British production of gray and malleable iron castings during the second quarter totaled 887,000 tons, a 6 per cent drop from the 945,000 tons for the like 1957 period, according to the Joint Iron Council, London.

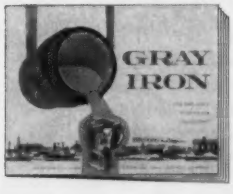
Despite the over-all reduction, castings production for the automotive industry, including tractors, was 9 per cent larger than a year ago. The automotive tonnage of 144,000 was a second-quarter record although 6.6 per cent below the first-quarter output.

Iron foundry employment at the end of June was 131,900, a 4 per cent decline from a year earlier.



Quality Products for the Foundry Trade

Send for Your Copy of This Free
GRAY IRON BROCHURE



An illustrated brochure on the Gray Iron Industry and its place in the nation's industrial economy. Includes descriptive data on casting practices and the story of the production of Neville Pig Iron and Neville Foundry Coke.

WSW 6394

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Circle 669 on Page 51

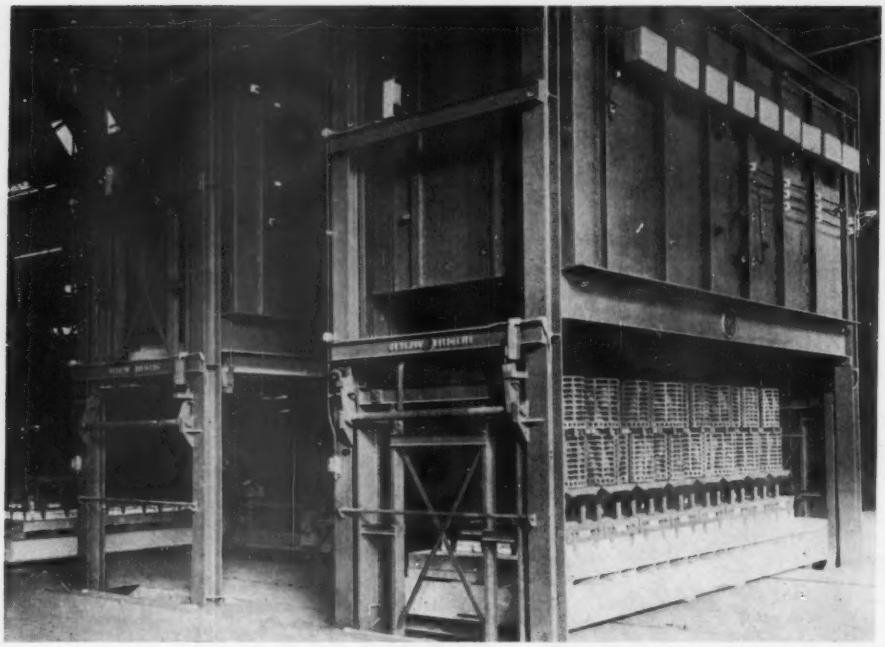


Fig. 1—View of typical gas-tight, electrically heated, elevator-type furnace used to anneal malleable iron castings

Fig. 4 — Typical installation of a protective atmosphere gas producer

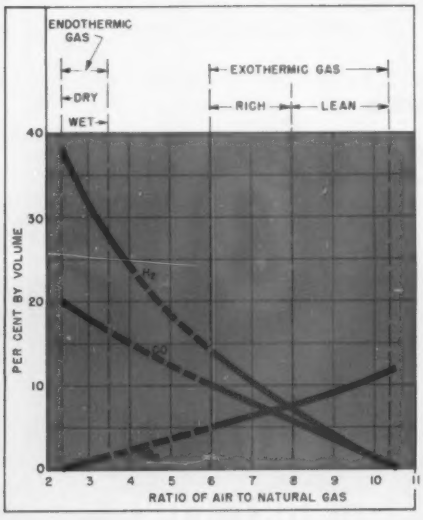


Fig. 2—Showing atmospheres available from endothermic and exothermic producers at various air-gas ratios

Protective Atmospheres for Malleable Iron Annealing

Use of a protective atmosphere in malleable iron annealing furnaces can improve casting quality, reduce maintenance, and provide better working conditions

By L. L. PATTON
Industrial Heating Dept.
General Electric Co.
Shelbyville, Ind.

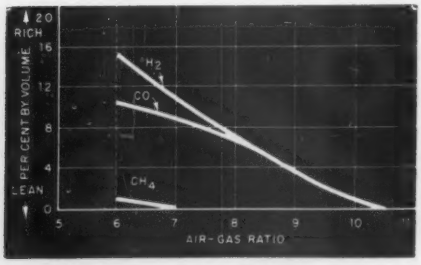
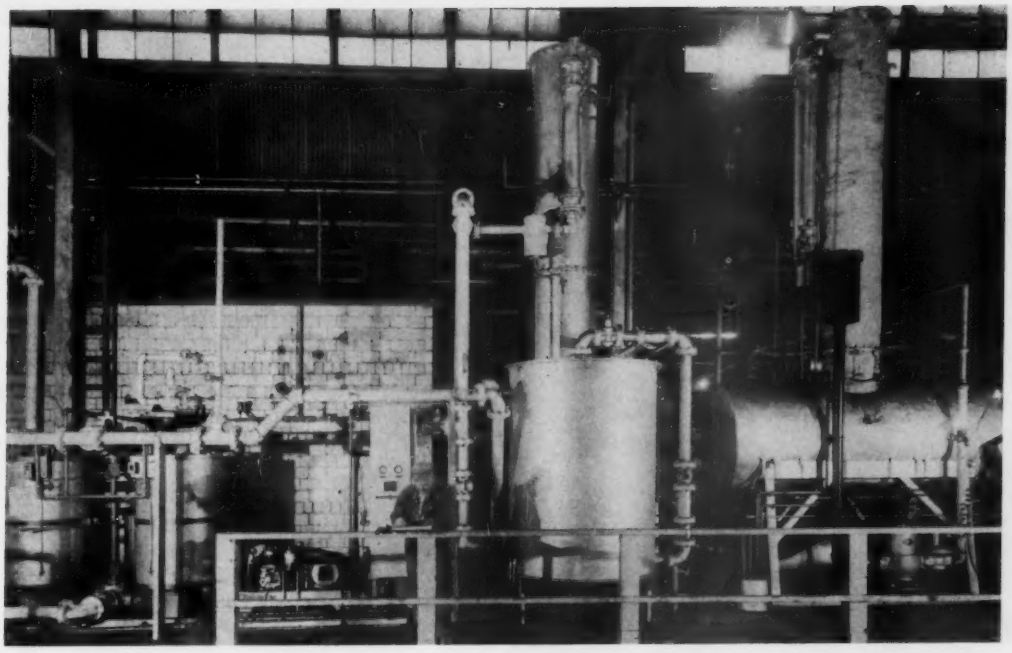


Fig. 3—Constituents of CO_2-free and dry gas at various air-gas ratios. Remainder N_2 and moisture



THE malleable iron industry long has recognized the importance of maintaining a protective atmosphere for malleable iron castings during annealing cycles. These protective atmospheres not only affect the rate of graphitization and, therefore, the length of the annealing process, but also affect the microstructure at the surface which may affect machinability and other physical properties.

An early practice still in use today requires careful packing of malleable iron castings in closed pots filled with packing material and sealed with fire clay. These pots are placed inside large, open-fired furnaces. Heating cycles extend as long as seven days before the castings are fully annealed. The sealed pots retain the protective atmosphere given off by the castings and protect them against excessive scaling from the furnace atmosphere.

Atmosphere - Tight Furnaces—More recently, the atmosphere-tight furnace, such as the electrically heated elevator-type furnace shown in Fig. 1, has eliminated the need for sealed pots. The gas-tight furnace casing excludes air and maintains the protective atmosphere given off by the casting. Castings thus can be loaded into open containers.

When malleable iron castings are heated in a gas-tight chamber, an atmosphere rich in carbon monoxide is formed. The following equations describe that part of the reaction which forms this atmosphere: 1. $2C + O_2 = 2CO$. 2. $2CO + O_2 = 2CO_2$. 3. $CO + H_2O = CO_2 + H_2$. 4. $C + CO_2 = 2CO$. 5. $CH_4 = C + 2H_2$.

The carbon for the CO in the atmosphere comes from iron carbides in the cast metal. As these reactions occur, carbon is removed from the metal. The extent of decarburization, as well as the analysis of the atmosphere, is dependent on annealing time and temperature as well as on the amount of air in the furnace.

The atmosphere formed in a gas-tight furnace varies during the high and low-temperature annealing cycles. The amount of CO present may be as high as 80 per cent during the high-temperature cycle and may drop to as low as 10 per cent during the low-temperature cycle. The CO_2 varies with the amount of CO; only 3 per cent may be present at the high-temperature cycle and 10 per cent during the low-temperature cycle. Water vapor and H_2 also are present in varying quantities, depending on the original moisture in the air admitted

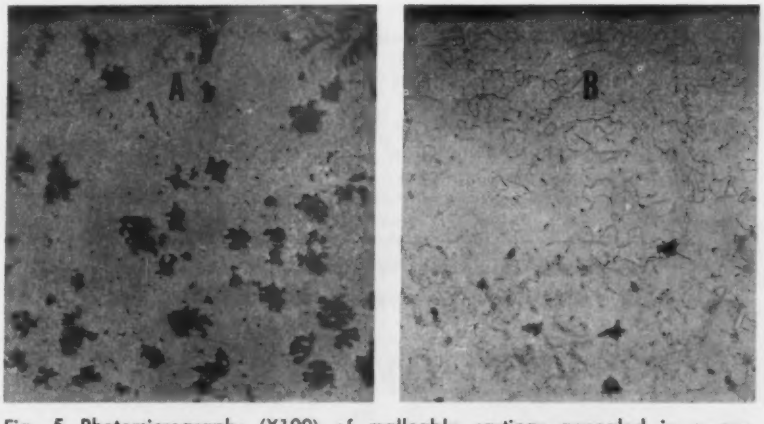
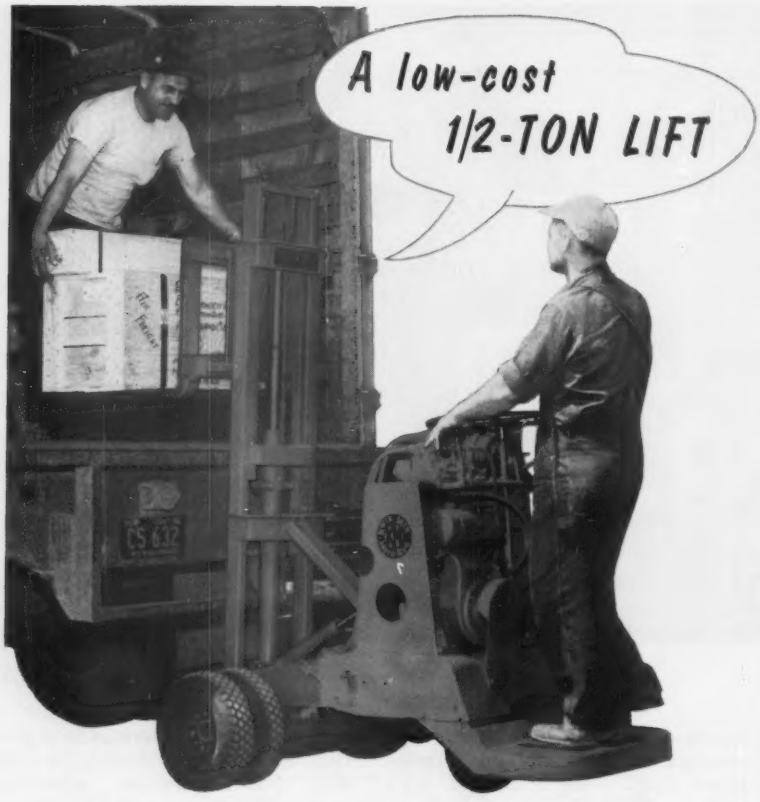


Fig. 5—Photomicrographs (X100) of malleable castings annealed in a continuous furnace. Sample A was annealed in an exothermic gas atmosphere, sample B in a 9 per cent CO and 4 per cent CO_2 atmosphere made by admitting air into the heating chamber. *(Courtesy Wagner Malleable Iron Co.)*



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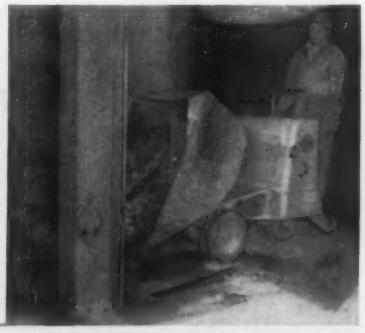

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to the furnace during loading; the amount of H_2 absorbed in the castings and driven off during the annealing cycle; and the amount generated by reversible chemical reactions between CO, CO_2, and H_2O and H_2 of the gas.

Methods Vary — Methods of applying protective atmospheres vary widely in the malleable iron foundry because of differences in furnace equipment and foundry practices. Many foundries with gas-tight furnaces use only the protective gas atmospheres formed by the castings. Frequently continuous furnaces are operated with a small quantity of air introduced continuously to control the CO/CO_2 ratio. Other foundries use protective atmospheres generated outside the furnace in separate atmosphere producers which produce suitable atmospheres by the partial or complete combustion of fuel gas.

Varieties of Atmosphere Gases

Fig. 2 shows the large variety of externally produced atmosphere gases available. Any one type of gas depends on whether the reaction taking place inside the gas producers is endothermic or exothermic as well as on the ratio of air and fuel gas fed to the producer. The basic difference between the two generators is that the air-gas ratio is high enough to support combustion in the exothermic gas producer, whereas the air-gas ratio for the endothermic generator is so low that the heat liberated will not support combustion, and external heat must be added.

There are many modifications of the basic endothermic and exothermic generators in which the atmosphere gas is treated further by passing it over incandescent charcoal or by further mixing it with additional raw fuel gas and passing it through an externally heated reaction chamber filled with catalyst brick. These treatments generally produce atmosphere gases free or partially free of moisture and CO_2, with higher amounts of CO and H_2 depending on whether the gas is treated with incandescent charcoal or fuel gas.

Another atmosphere being widely used is a purified exothermic gas marketed under the tradename Neutralene. Fig. 3 shows its constituents. The air-gas mixture first is combusted inside a reaction chamber. Moisture formed during combustion is removed in a gas cooler. CO_2 is removed from the combusted gas by a chemical absorbent in the CO_2 absorbing tower, and water vapor is removed to a $-40°$ F

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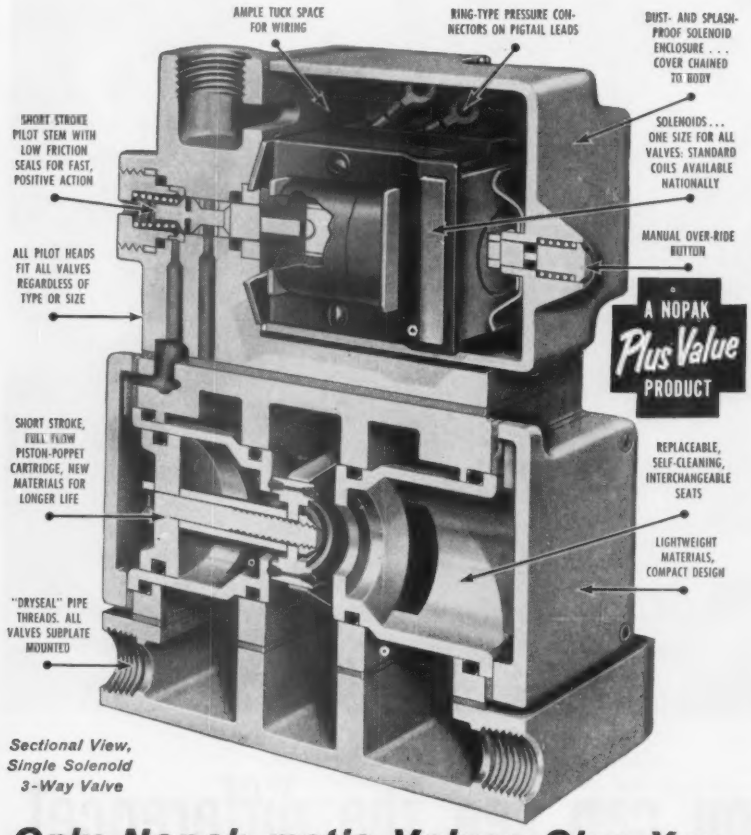
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dew point by the drying equipment.

The chemical absorbent will absorb CO_2 when the solution is around 100° F or below and will release CO_2 as a gas when heated. The reaction chamber is built inside the chemical solution boiler so that the heat formed by combustion will reactivate the chemical solution. Economic operation is assured because the operation is continuous, and reactivation is provided by heat that normally is wasted.

Fig. 4 shows a typical installation of this type of gas producer in a malleable iron foundry. It has sufficient capacity to provide protective atmospheres for several large, continuous-annealing furnaces and can be used to anneal either malleable or pearlitic malleable iron.

Any atmosphere having CO, CO_2, H_2, and H_2O present has the following reversible reaction: $CO + H_2O = CO_2 + H_2$. The reaction reaches equilibrium condition in accordance with the following equation: $(CO)\ (H_2O) \div (CO_2)\ (H_2) = K$. The constant K varies with temperature.

React with Carbon

Both CO_2 and H_2O react with carbon. During the annealing cycle, the outer surfaces of the castings are decarburized by these reactions. To inhibit decarburization, the atmosphere must not contain appreciable quantities of these constituents having this reversible reaction and must be inert to carbon. Even though many foundries have recognized that an atmosphere such as nitrogen gas would be inert, its use has been previously limited because of its high cost when obtained from bottles.

However, when Neutralene gas is obtained from a high air-gas ratio—approximately 10 to 1—it is essentially nitrogen (see Fig. 3), and its cost is very low—approximately 13 cents per 1000 cu ft. Bottled nitrogen costs approximately $10-12 per 1000 cu ft.

A typical analysis of Neutralene taken at the discharge side of the drying equipment is 0.2 per cent CO, 0.2 per cent H_2, and 99.6 per cent remainder, which is essentially N_2 and −40° F dew point. The gas is essentially CO_2-free and dry. The flow of protective gas to the furnace must be sufficient to maintain a slight positive pressure inside the furnace chamber. Where the gas is admitted at various points along the heating and cooling chambers, a diluent type carbon-inert atmosphere is formed which reduces the concentration of decarburizing constituents and minimizes air infiltra-

Circle 672 on Page 51

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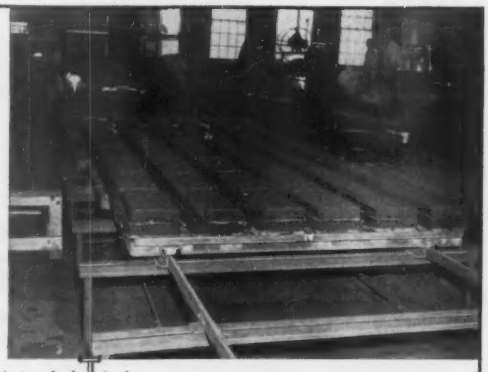

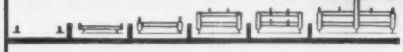

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tion at any existing leaks.

The analysis of the atmosphere formed inside a typical gas-tight pusher furnace using Neutralene showed 1.5 to 2 per cent CO, 0.5 to 1.5 per cent CO_2, and remainder N_2, with 25° F to −10° F dew point.

The photomicrographs shown in Fig. 5 were taken from similar malleable iron castings, one of which was annealed in a furnace using Neutralene as an inert atmosphere (left, Fig. 5) and the other (right) in a furnace atmosphere obtained by admitting air to limit the CO/CO_2 ratio to 9 per cent CO and 4 per cent CO_2 and 75° F dew point. Note the presence of carbon nodules near the outer skin of the casting annealed in Neutralene gas. In the other casting, the nodule-free ferritic rim extends to 0.020 in.

Machinability—The surface condition of malleable iron castings affects the machinability and other physical properties of the castings. The absence of carbon nodules in the outer skin, shown at the right in Fig. 5, may extend a considerable distance. Under these conditions a heavy pearlitic rim also may occur. These conditions may decrease machine tool life.

A feature desired in malleable and pearlitic malleable iron castings for automatic machining operations is uniform machinability. Surface hardening requires castings with available combined carbon content at the surface. Inert atmospheres are enabling many foundries to obtain castings with better machinability and more uniform microstructure.

Labor Savings—A recent survey of foundries using Neutralene indicated that in addition to product improvement, an important benefit has been the ability to leave castings in continuous-annealing furnaces for prolonged periods without damaging the castings. For example, one foundry now operates its continuous-annealing furnace on two 8-hour shifts a day, five days a week, and holds castings over weekends without damage.

Between shifts, the castings remain in the furnace, and production is resumed readily at the start of the next shift. In this instance, labor savings were sufficient to warrant the capital investment in the new atmosphere equipment. Employee morale improved because furnace operators work the same hours as employees in other departments.

Previously, this same foundry operated its annealing furnaces on a 29-hour cycle. A full 29 hours

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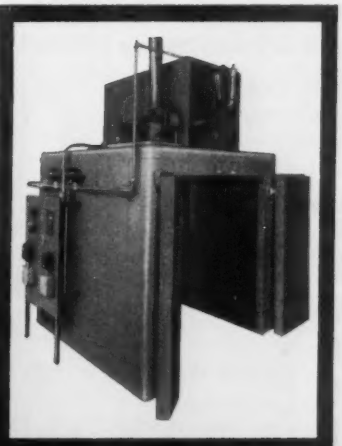

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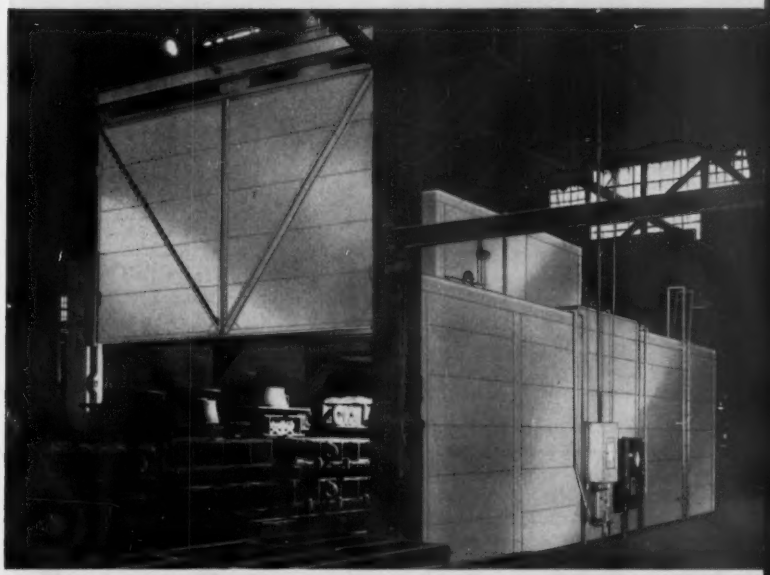

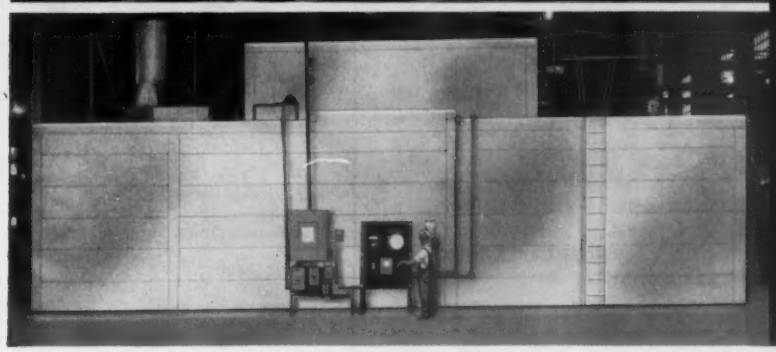

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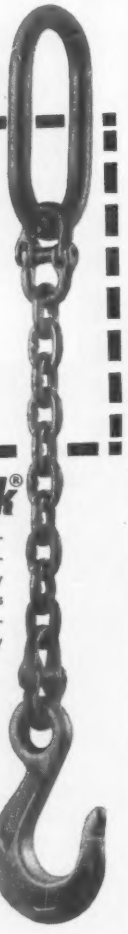

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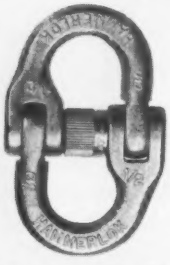

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was required to completely charge the furnace and another 29 hours to empty it. Thus a minimum of 58 hours was required every time a furnace was shut down. Because of this schedule, the furnace was operated on a continuous basis 24 hours a day, 7 days a week, and 52 weeks a year. This operation resulted in high labor expense. Three shifts daily were required for seven days a week, and overtime, weekend, and holiday premiums were necessary. Morale of the furnace operators was low, and labor turnover was high because of long hours, swing-shift assignments, and weekend and holiday work.

Another foundry used a noncombustible gas composed of 88 per cent N_2 and 12 per cent CO_2 to purge the entrance and discharge vestibules of a large, pusher-type furnace. Each charge cycle required that the noncombustible gas replace or purge out the explosive furnace atmosphere in the outer purge chambers before loading or unloading operations. Failure to purge could result in an explosion which could either damage the equipment or endanger the workers.

This foundry now uses Neutralene, with the result that the explosive atmosphere no longer is present, and the noncombustible purge gas no longer is required. Another saving also resulted because the total flow of gas to the furnace now is only 50 per cent of that previously required for purging alone.

Repair Costs Cut—The replacement costs of alloy parts such as trays, rails, rolls, and firing tubes represent a sizable operating expense for every foundry. Because of lost production when these repairs are made and because of damaged castings caused by a firing tube rupture, the total cost of furnace repairs is considerably higher than the replacement cost of the defective material. All foundries using the purified exothermic gas report better life of alloy parts and furnace refractory and less downtime for repairs. Many alloy part failures caused by intergranular corrosion attributed to high CO in furnace atmospheres have been completely eliminated.

Carbon Dropout—Anyone experienced in malleable iron heat treating is familiar with the destructive force of carbon dropout in refractory materials. It may be caused by the presence in refractory materials of iron oxides which promote the reaction $2CO = C + CO_2$ at a criti-

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Page 51

cal temperature range. The carbon grows around particles of iron oxide, exerting destructive strength which damages the brickwork. This damage can be minimized by using refractory materials full of iron oxides and an atmosphere which prevents the accumulation of CO in harmful quantities.

The additional cost incurred in providing protective atmospheres for annealing furnaces is repaid many times in benefits gained by producing superior castings, by reduced maintenance, and by improved working conditions in the annealing room.

ASM Honors Three Men with Awards at Annual Meeting

Three major awards given annually by the American Society for Metals for service to and achievements in the science of metals were presented at the society's annual meeting held during the 40th National Metal Exposition and Congress in Cleveland Oct. 27-31.

Dr. Albert J. Phillips, vice president and director of research, American Smelting & Refining Co., South Plainfield, N. J., won the society's Gold Medal. The Medal for Advancement of Research was presented to Crawford H. Greenewalt, president, E. I. DuPont de Nemours & Co., Wilmington, Del. William G. Pfann, physical metallurgist, Bell Telephone Laboratories Inc., Murray Hill, N. J., received the Albert Sauveur Achievement Award.

Ernest E. Thum, editor-in-chief of the society's journal, *Metal Progress*, was selected as an honorary member of the society.

Book Review

Transactions of the American Foundrymen's Society, Vol. 65 (1957), cloth, 605 pages, 8¼ x 11½ in., published by the American Foundrymen's Society, Des Plaines, Ill.

This annual publication contains 82 papers and discussions which were presented at the 1957 meeting of the society held in Cincinnati. They cover a wide range of topics relating to the production of castings in ferrous and nonferrous alloys. The volume also contains the Edgar Hoyt lecture on "Progress in Castings" presented by Hyman Bornstein, reports of the general manager and treasurer of the society, and minutes of the meetings of the society's board of directors.

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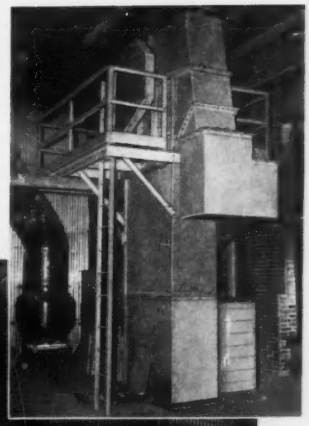

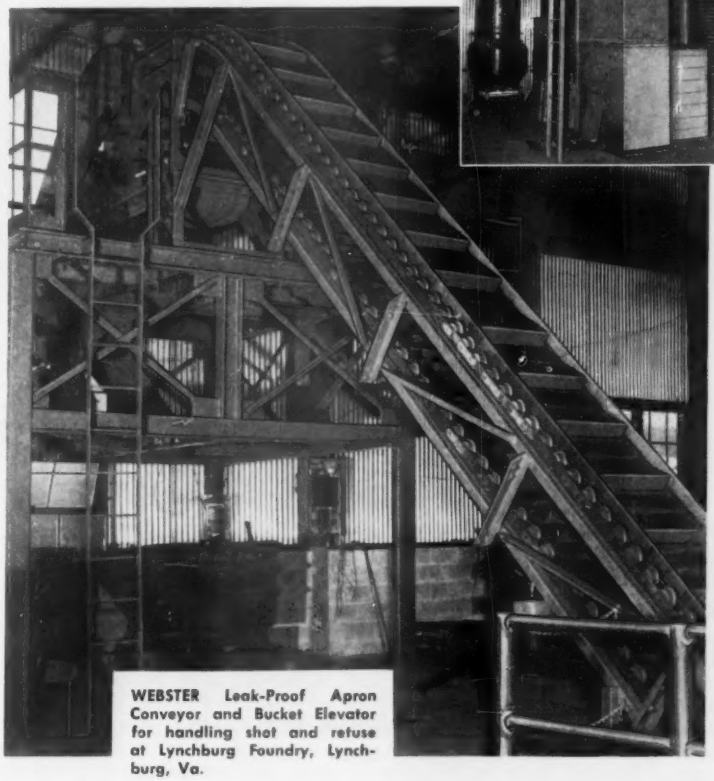

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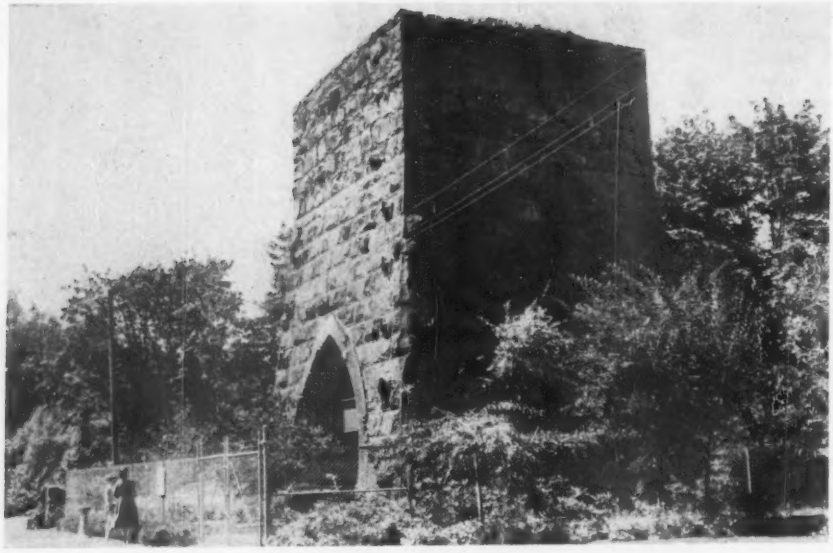

This first iron smelter west of the Rocky Mountains now is a tourist attraction in the city park at Oswego, Oreg.

By **BILL WALKINS**
Electric Steel Foundry Co.
Portland, Oreg.

The West's First Iron Furnace

CONDITIONS in the Pacific Northwest were ideal at the time for construction of the furnace and facilities of the Oregon Iron Co., which melted the first heat of pig iron produced west of the Rocky Mountains on Aug. 24, 1867.

The site was Oswego, Oreg., on a bluff overlooking the Willamette River. Here the outlet of Lake Oswego, known then as Sucker Creek and today as Oswego Creek, provided adequate water power. Oregon fir, for the production of charcoal, grew in profusion, and an entire mountain of iron ore, testing 60 per cent pure iron, was within shouting distance.

W. S. Ladd, Oregon's first banker and one of its first merchants, with 20 shareholders put up the $500,000 which gave the company its start. Oregon Iron Co., also known as Oswego Iron Works and later as Oregon Iron & Steel Co., employed 80 workers at its peak of production and produced 25 tons of pig iron in a 24-hour day.

Furnace Still Stands—The furnace, constructed of native basalt and lined with Scotch firebrick, still stands in the city park at Oswego. It is 32 ft high, measures 34 ft at the base and 26 ft at the top. It was built adjacent to a steep hillside and was charged from a bridge house 129 ft long. One end of the bridge house rested on the hillside, supported by heavy trusswork and connecting with the stack. The furnace had a capacity, according to records, of "800 bushels." It was stacked with alternate charges of 26 bushels of charcoal, 800 pounds of ore, and 20 per cent limestone.

Charcoal was produced at the site. Ore was mined first by open-pit methods and later by drifting, and transported to the furnace by ox team until the ox road was replaced by a narrow-gage railroad. Limestone, the only essential material not available in the neighborhood, was brought from a quarry near Seattle.

A dam, 148 ft long and 22 ft high was built across Sucker Creek, and water flowed through a 900-ft flume to operate a water wheel at the mill. Two wooden blowing cylinders, each 5 ft in diameter and having a 6-ft stroke, supplied air at a regulated flow of $\frac{5}{8}$ psi, to a 40-ft chimney atop the furnace which contained an air heating oven. The blast was forced downward from the oven through tubes built into the furnace walls and entered the furnace hearth through water-cooled tuyeres.

Competition from the East—The plant enjoyed a degree of prosperity for some years, but never was a financial success. As mining progressed on Iron Mountain, the ore became harder and contained less iron than the surface deposits. Discovery of the huge iron deposits in the Mesabi Range of Minnesota almost simultaneously with the coming of the railroads to the Pacific Northwest spelled the doom of the Oregon Iron Works and shattered the forlorn dream of those who envisioned Oswego as Oregon's future metropolis and the Pittsburgh of the West. Pig iron from the East, melted with coal and shipped by rail, could be delivered in Portland cheaper than it could be produced at the Oswego furnace.

The company produced its final heat of pig iron in November, 1885, leaving slag dumps on the shores of the Willamette, drift scars on Iron Mountain and traces of old charcoal pits as evidence of its existence. During its 18 years of production it contributed 40,625 tons of pig iron to Northwest industry.

The area in the vicinity of the old furnace is now a state park. The remainder of the property belongs to Reed College, the Ladd estate, and several other interests.

Oswego and its environs is now an upper middle class residential area dotted with suburban homes of Portland business men. Swimmers, fishermen, water skiers, and speedboat enthusiasts cavort in the waters of Lake Oswego and the nearby Willamette River.

The stack in the city park, looking more like the ruins of an ancient chapel than an iron furnace, stands as a lasting monument to Oregon's industrial pioneers.

- **DESIGN**
- **PRODUCTION**
- **SALES**

MECHANICAL ENGINEERING

and the FOUNDRY INDUSTRY

The field of Mechanical Engineering embraces the broad areas of generation, transmission and utilization of heat and mechanical energy and the production of tools, machines and products. It is, at least numerically, the most widely applied discipline in the foundry industry.

Today, thousands of Mechanical Engineering students are studying Foundry as an engineering process and cast metals as an engineering material at FEF schools.

As future foundrymen—or as potential casting customers—these Mechanical Engineering students are very important to the foundry industry.

Help us reach—and teach—Mechanical Engineers about our industry and its products.

Foundry Educational Foundation

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Circle 683 on Page 51

Foundry Statistics

ALUMINUM

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1956	794,581	171,181	245,421	376,230	.....
1957					
July	52,173	10,447	16,322	25,339	89,430
7 mo.	461,089	90,505	140,230	239,160	.....
Aug.	55,735	10,996	18,398	26,319	89,826
Sept.	58,692	11,367	17,820	24,900	93,720
Oct.	64,140	11,570	20,543	31,936	91,817
Nov.	58,898	10,411	18,611	29,793	91,860
Dec.	53,102	9,302	16,724	26,978	86,323
Total	751,656	144,151	232,326	369,086	.....
1958					
Jan.	57,845	10,724	18,082	28,937	77,067
Feb.	50,695	9,601	15,456	25,279	75,647
Mar.	50,547	9,311	15,255	25,918	63,600
Apr.	44,948	9,531	13,369	21,956	60,317
May	44,093	9,312	13,648	21,091	59,666
June	40,701	8,644	13,679	18,292	63,670
July	38,818	8,658	12,342	17,714	68,618
7 mo.	327,647	65,781	111,831	159,187	.....

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1956	951,868	557,636	812,905	479,563	138,963	78,073	.....
1957							
July	57,748	34,876	45,100	27,290	12,648	7,586	80,694
7 mo.	529,097	323,660	435,637	268,700	93,440	54,960	.....
Aug.	65,426	39,644	55,320	33,781	10,106	5,863	84,876
Sept.	62,457	38,397	52,281	31,658	10,176	6,739	83,385
Oct.	77,667	45,989	66,043	39,269	11,624	6,720	82,995
Nov.	67,904	38,085	55,564	31,036	12,340	7,049	80,074
Dec.	60,425	34,343	48,694	27,218	11,731	7,125	74,563
Total	862,976	520,118	713,539	431,662	149,437	88,456	.....
1958							
Jan.	62,734	34,920	51,440	28,516	11,294	6,404	67,292
Feb.	54,650	31,006	45,419	25,381	9,231	5,625	59,047
Mar.	51,708	29,624	43,368	24,333	8,340	5,291	54,330
Apr.	50,695	29,388	41,794	23,605	8,901	5,783	47,664
May	48,306	26,656	40,092	21,710	8,214	4,946	46,603
June	51,882	31,077	42,910	25,679	8,972	5,398	48,260
July	41,865	24,479	33,857	20,023	8,008	4,456	58,340
7 mo.	361,830	206,150	298,940	169,247	62,960	37,903	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1956	966,306	866,545	57,522	.....
1957				
July	60,621	54,847	3,010	44,175
7 mo.	515,621	461,955	28,480	.....
Aug.	71,233	64,953	3,278	40,446
Sept.	70,804	64,470	3,243	40,298
Oct.	81,836	74,391	3,693	39,063
Nov.	70,187	63,944	3,006	34,249
Dec.	65,708	59,606	3,046	31,509
Total	875,389	788,319	44,696	.....
1958				
Jan.	69,707	63,294	3,327	30,341
Feb.	58,356	52,579	3,202	27,243
Mar.	60,157	54,007	3,395	25,434
Apr.	59,311	53,271	3,385	25,621
May	57,506	51,634	3,077	22,867
June	57,124	51,967	3,001	21,578
July	51,124	46,636	2,351	20,518
7 mo.	413,285	373,388	21,738	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1956	36,168	33,580	.....
1957			
July	2,544	2,384	6,964
7 mo.	20,083	18,924	.....
Aug.	2,315	2,150	6,222
Sept.	2,279	2,071	5,705
Oct.	2,192	2,093	5,318
Nov.	1,920	1,806	4,802
Dec.	1,533	1,408	4,323
Total	30,322	28,452	.....
Jan.	1,881	1,756	5,227
Feb.	1,803	1,730	5,589
Mar.	1,975	1,860	5,555
Apr.	2,215	2,141	5,555
May	2,422	2,196	5,200
June	2,205	1,996	5,515
July	2,200	2,063	6,706
7 mo.	14,701	13,741	.....

PRODUCTION WORKERS

Estimated Number	June 1958	May 1958	June 1957
Ferrous	159,800	159,800	203,100
Nonferrous	43,900	42,700	57,900
Average Weekly Earnings			
Gray Iron	$82.43	$80.86	$85.24
Malleable Iron	85.81	81.45	84.89
Steel	88.81	87.00	96.41
Nonferrous	93.60	90.87	91.88
Average Weekly Hours			
Gray Iron	36.8	36.1	39.1
Malleable Iron	37.8	36.2	39.3
Steel	36.7	36.1	41.2
Nonferrous	40.0	39.0	40.3

Source: Bureau of Labor Statistics.

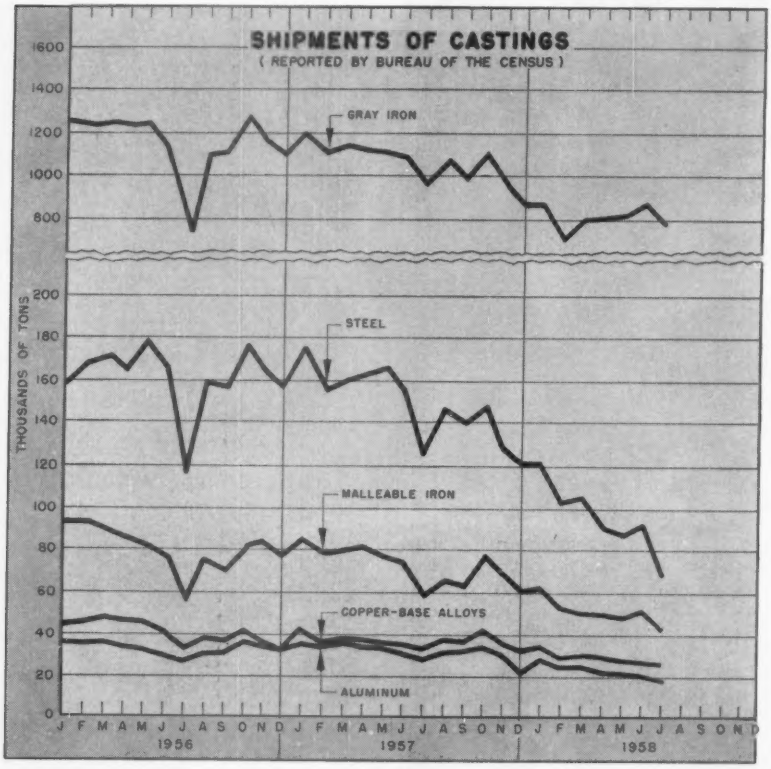
GRAY IRON CASTINGS—SHIPMENTS (Net tons[1])

	All Castings		Miscellaneous Castings		Nodular Iron Castings	Heavy Steel Ingot Molds	Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	Total	Total	Total[3]	Total[3]	
1956	13,860,527	7,960,391	8,265,526	3,647,991	.....	2,624,146	406,191	1,746,902	817,762	.....
1957										
July	954,102	523,489	565,897	243,187	10,901	190,434	31,209	106,532	60,030	825,676
7 mo.	7,694,690	4,188,730	4,751,314	2,034,854	.....	1,474,471	232,894	806,662	428,148	.....
Aug.	1,075,957	596,779	630,130	265,185	10,339	205,655	28,976	138,209	72,987	825,676
Sept.	990,139	563,477	579,444	259,649	10,253	202,914	23,681	119,689	64,411	805,301
Oct.	1,099,554	601,109	668,895	282,024	11,974	210,521	26,306	122,149	71,683	740,169
Nov.	940,138	482,732	599,292	242,847	10,601	166,652	24,302	91,138	58,754	704,623
Dec.	864,226	443,670	557,154	226,356	9,810	148,074	23,173	73,500	62,325	675,838
Total	12,664,504	6,876,497	7,786,229	3,310,915	.....	2,409,290	359,332	1,351,345	758,308	.....
1958										
Jan.	868,255	436,398	580,545	229,014	10,800	135,110	23,511	78,863	50,226	638,069
Feb.	753,306	389,708	503,175	203,717	10,245	116,168	25,959	67,606	40,398	632,490
Mar.	795,568	446,822	499,751	215,916	9,485	125,887	24,777	87,716	57,437	589,912
Apr.	806,720	457,498	483,999	210,344	8,015	121,489	25,401	112,292	63,539	582,446
May	820,054	472,192	469,026	203,025	5,671	134,312	23,498	123,017	70,201	570,293
June	867,948	541,904	503,252	245,651	5,773	135,477	22,928	129,671	76,620	572,706
July	791,560	465,650	430,882	185,275	3,999	157,478	19,928	110,790	72,481	580,155
7 mo.	5,703,411	3,210,172	3,470,630	1,492,942	53,988	925,921	166,002	709,955	430,722	.....

STEEL CASTINGS—SHIPMENTS (Net tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[2]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1956	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
July	122,018	90,037	22,303	91,730	67,719	21,426	30,288	22,318	1,377	489,390
7 mo.	1,086,964	839,279	203,982	817,606	628,354	189,224	269,458	210,925	14,704	.....
Aug.	145,926	111,080	33,641	113,167	86,407	31,639	32,759	24,673	2,002	471,190
Sept.	139,002	105,611	29,718	106,261	80,871	27,885	32,741	24,740	1,863	438,510
Oct.	146,397	113,216	31,477	110,100	85,144	29,320	36,297	28,072	2,157	395,907
Nov.	127,115	98,436	26,892	93,343	71,846	25,105	33,772	26,590	1,787	362,948
Dec.	120,787	92,125	23,403	88,101	66,468	21,808	32,686	25,657	1,595	327,337
Total	1,766,191	1,359,747	349,059	1,328,478	1,019,090	324,951	437,713	340,657	24,108	.....
1958										
Jan.	120,722	94,717	22,545	87,525	68,203	21,115	33,197	26,514	1,430	304,907
Feb.	103,297	79,708	16,647	74,283	56,781	15,273	29,014	22,927	1,374	282,358
Mar.	106,233	82,195	16,180	77,564	60,208	15,240	28,669	21,987	940	252,840
Apr.	91,464	69,121	11,956	65,639	45,998	11,107	25,825	20,123	849	229,503
May	87,002	66,086	10,416	61,105	45,967	9,463	25,897	20,119	953	211,346
June	92,861	71,624	14,185	67,227	50,919	12,987	25,634	20,705	1,198	190,779
July	68,802	48,618	5,400	46,858	32,161	4,656	21,944	16,457	744	200,272
7 mo.	670,381	512,069	97,329	480,201	363,237	89,841	190,280	148,802	7,488	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.



COKE PRODUCTION AND CONSUMPTION

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1956 ...	74,454,264	73,814,941	2,856,395
1957			
July ...	6,501,595	6,375,616	180,698
7 mo. .	45,984,195	45,908,916	1,523,198
Aug. ...	6,519,973	6,401,949	206,907
Sept. ...	6,296,519	6,186,475	199,226
Oct. ...	6,275,567	6,120,485	208,720
Nov. ...	5,615,746	5,425,296	199,052
Dec. ...	5,164,965	5,099,556	173,470
Total .	75,772,353	74,961,606	2,509,025
1958			
Jan. ...	4,762,050	4,643,022	192,098
Feb. ...	4,078,728	4,030,849	171,362
Mar. ...	4,343,326	4,208,343	168,194
Apr. ...	3,837,040	3,597,518	152,935
May ...	3,899,004	3,733,239	158,858
June ...	3,934,480	3,939,586	151,007
July ...	3,958,634	3,851,264	140,144
7 mo. .	28,811,715	28,002,325	1,135,611

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1957	1958
Jan.	25,681	20,468
Feb.	20,769	17,413
Mar.	21,948	18,825
Apr.	23,507	18,009
May	22,037	17,191
June	18,888	17,962
July	16,695	16,658
Aug.	19,654	17,882
Sept.	19,670	.....
Oct.	22,800	.....
Nov.	19,767	.....
Dec.	16,875	.....
Total for year	248,291	.....

Source: Defense Council of the Ingot Brass and Bronze Industry.

ZINC-BASE ALLOYS

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1956	693,728	449,516	.....
1957			
July	48,379	29,418	64,043
7 mo. ..	395,417	252,453	.....
Aug.	49,829	34,040	64,789
Sept.	47,736	33,838	68,122
Oct.	62,332	39,990	69,275
Nov.	58,689	35,005	63,665
Dec.	49,597	29,998	58,792
Total ..	663,600	425,334	.....
1958			
Jan.	50,568	30,368	55,883
Feb.	42,687	27,482	50,676
Mar.	39,719	26,782	43,366
Apr.	35,796	23,830	27,634
May	36,447	24,588	33,438
June	38,132	25,993	34,888
July	32,765	22,843	41,534
7 mo. ..	276,114	181,886	.....

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1957	1958
Jan.	117.9	57.9
Feb.	188.4	57.6
Mar.	127.0	85.9
Apr.	101.1	88.7
May	136.2	136.1
June	187.5	87.7
July	98.6	77.9
Aug.	231.3	74.1
Sept.	113.9	....
Oct.	145.3	....
Nov.	59.6	....
Dec.	61.4	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent monthly average.

Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

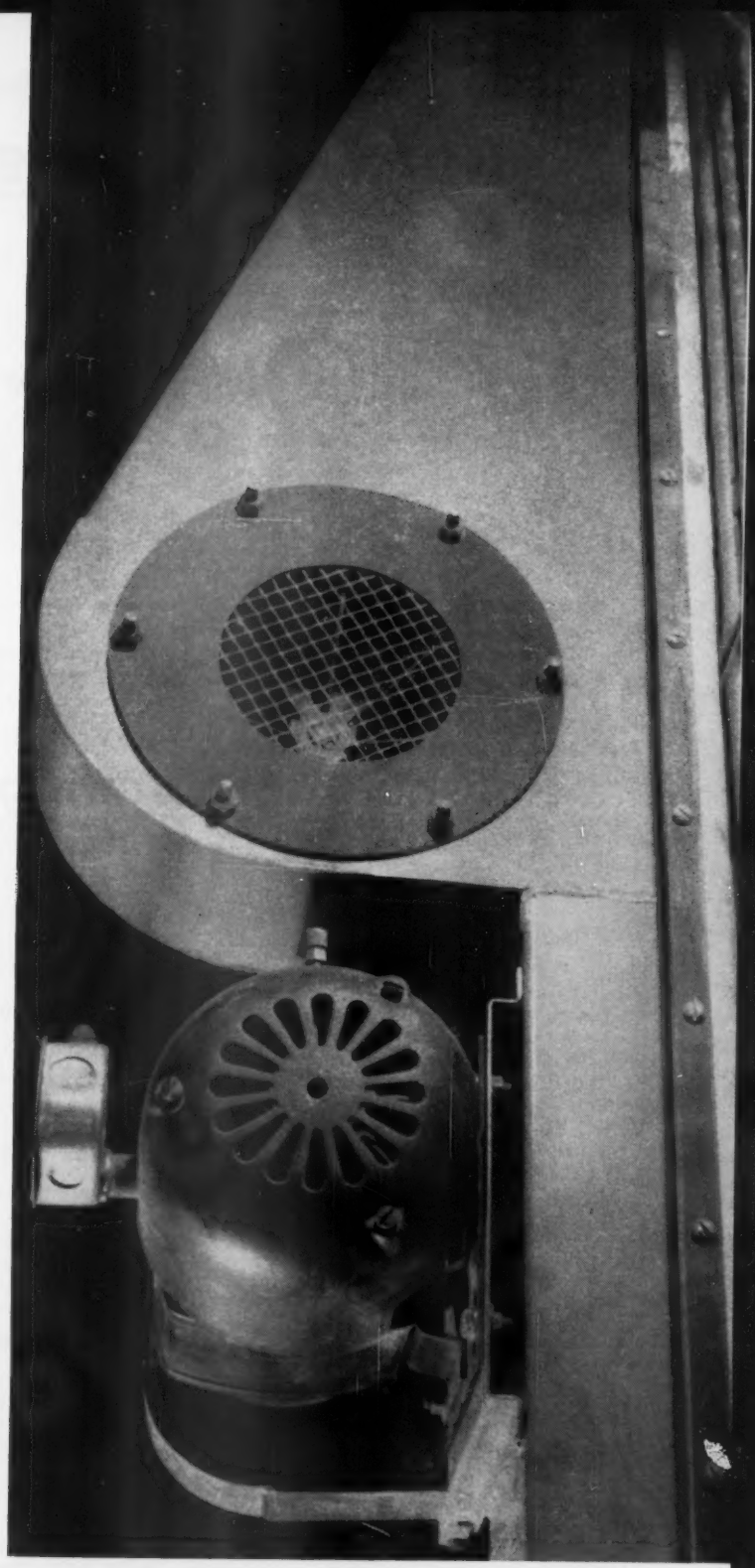
	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1956	71,709,489	9,817,287	1,133,128	9,862,887
1957				
June	5,430,607	744,790	80,063	705,590
6 mo. ...	35,963,629	4,885,279	558,830	4,965,213
July	4,897,752	652,773	68,504	629,395
Aug.	5,299,543	765,877	81,941	759,517
Sept.	5,033,998	721,125	82,948	672,597
Oct.	5,333,767	817,338	91,766	718,791
Nov.	4,858,489	716,095	72,871	589,879
Dec.	4,281,414	661,918	70,091	542,008
Total ...	65,688,592	9,220,405	1,026,951	8,876,400
1958				
Jan.	4,072,071	704,654	76,989	566,225
Feb.	3,491,441	611,394	64,971	466,657
Mar.	3,718,132	624,165	64,866	524,035
Apr.	3,429,121	599,427	61,839	531,220
May	3,862,491	596,253	59,060	553,756
June	4,409,006	615,271	62,703	605,733
6 mo. ...	22,982,262	3,751,164	390,428	3,247,626

PIG IRON PRODUCTION AND CONSUMPTION

	Production**—Net Tons: Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption*—Gross Tons: Total	Cupola	Air	Electric
1956	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	66,967,618	4,786,011	261,377	211,193
1957									
July	6,625,901	221,929	336,590	5,515,736	551,646	5,558,702	306,119	14,735	17,992
7 mo. ..	47,889,558	1,345,180	2,284,274	49,862,662	4,397,442	41,178,246	2,536,918	135,448	136,494
Aug.	6,719,763	228,378	298,269	5,451,691	741,425	5,769,995	349,988	17,540	25,948
Sept.	6,569,074	218,297	292,244	5,272,056	786,477	5,645,036	321,728	17,084	28,638
Oct.	6,454,450	164,944	303,104	5,390,851	595,551	5,669,624	354,364	18,466	24,691
Nov.	5,711,242	153,722	290,547	4,759,255	507,718	5,073,898	309,674	14,886	17,199
Dec.	5,212,624	165,268	228,897	4,394,869	423,590	4,565,635	288,219	14,754	13,881
Total[3] ..	78,557,011	2,275,789	3,697,335	65,131,684	7,452,203	67,902,434	4,160,891	218,178	246,851
1958									
Jan.	4,785,269	100,697	232,802	4,036,451	415,859	4,208,692	306,794	16,102	14,426
Feb.	4,016,276	106,921	193,429	3,396,382	319,094	3,551,679	260,940	14,014	7,740
Mar.	4,418,778	156,386	227,785	3,645,353	389,254	3,824,140	270,214	13,472	8,753
Apr.	3,787,907	136,180	173,139	3,063,634	424,954	3,378,893	262,007	13,975	9,585
May	4,048,328	127,438	165,045	3,359,836	396,009	3,691,550	256,204	12,001	11,764
June	4,396,285	121,869	167,192	3,764,607	342,617	4,058,714	262,883	12,098	15,549
July	4,277,515	123,075	156,582	3,595,008	402,850	.....	.....	.....	.....
7 mo.[3] ..	29,730,198	871,966	1,282,332	24,927,783	2,648,117	.....	.....	.....	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Monthly figures do not add up to totals shown because of unreported monthly revisions.

You're looking at the exclusive key to continuous dust collecting!



You are inside a Pangborn Dust Collector. And this is Pangborn's traveling manifold . . . the exclusive self-cleaning development that permits continuous suction at highest efficiency. The result is the incomparable performance of cloth type collectors with minimum resistance to air flow and with no shutdown required.

Typical Pangborn engineering . . .

This advance is particularly important in collecting finely-divided dry dusts. But the Pangborn engineering it typifies is important to *any* dust-producing plant. It is not enough to place a dust collector within a plant. An efficient dust collecting system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This *thinking* is incorporated into every Pangborn proposal.

. . . that can help you

One of Pangborn's comprehensive line of dry and wet dust collectors can be utilized in a Pangborn-engineered dust system to solve *your* dust problem . . . whether it involves any kind of fine, coarse, dry, moist, corrosive, hot or obnoxious dusts.

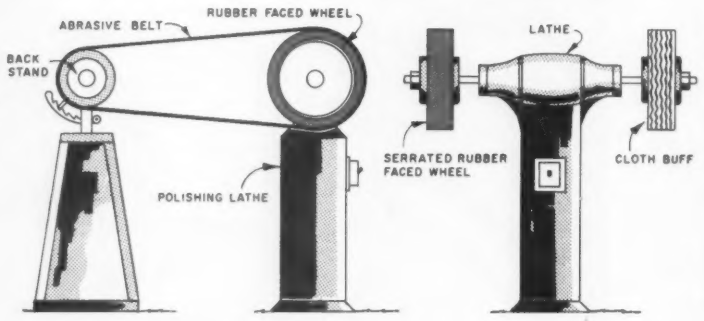
The Pangborn engineer in your area will be glad to take off his jacket and go to work for you. He is a dust *expert* and will discuss your individual problem at no obligation. And, for more information, write for "Out of the Realm of Dust" to: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

Circle 684 on Page 51

Trouble Shooting

By C. W. AMMEN



Drawings show side and front views of a polishing lathe setup suitable for polishing and buffing aluminum sand castings

Polishing and Buffing
Aluminum Sand Castings

Dear Charlie:

Some time back we went into making a simple device consisting of an assembly of several small castings. Everything is done here in the shop with the exception of polishing two sandcast aluminum parts. These two castings we send out to be polished and buffed at a local plating shop. It's hard enough to get this outfit to do them, and it keeps upping the price. We think it wants to get rid of the job.

Having nowhere to go other than to send the job out of town, we decided to try our hand at it. Going over the castings with a belt sander and then with a buffing wheel with tripoli takes too long, however, and we can't squeeze any information out of the local plater on the procedure he uses.

Sincerely,
Sam

Dear Sam:

At one time considerable polishing and buffing was done in the foundry, but such operations today are limited mostly to captive shops producing builders' hardware, plumbing ware, etc.

Polishing and buffing is, as no doubt you know, a trade in itself, and it has many tricky aspects, to say the least. Your use of a belt sander to buff is essentially correct, but the sequence of operations necessary to polish and buff aluminum sand castings depends on the particular job, condition of the castings, and other factors.

Two basic systems are used to polish. One is to use a backstand and a polishing lathe with endless abrasive belts. The other is to use set-up wheels made of felt, leather, canvas, or a similar material. These wheels first are coated with glue, then rolled in emery of the desired grit, and allowed to dry. I would not advise you to go into headed polishing wheels unless you can employ a good, old-time polisher who can head up wheels for a small, single-purpose polishing and buffing operation such as you intend to do. I would stick to belts.

In any event, to produce a good finish, it is necessary that the polishing operation be carried out correctly. You cannot buff aluminum castings by first polishing with one grit. The general practice used in polishing aluminum sand castings is to employ three grits, one for roughing out, one for fining, and one for oiling. For very rough castings, use No. 60 for roughing, No. 120 for fining, and No. 180 for oiling. For fairly smooth castings, use No. 80, No. 150, and No. 200, respectively.

Your backing wheel should be about 16 in. in diam, and the width depends on the work. Most backing wheels in use today are rubber-faced and should be purchased together with the backstand, as a unit. The backing wheel should run at about 2300 rpm. Your belt supplier will advise you as to speeds, backing wheel diameter, and other variables on the basis of your particular job.

Let's say that your castings are fairly smooth. Put on the No. 80 grit belt and rough out all the pieces at one time. Remember that you are grinding. Take care to maintain the correct shape and contour. When this operation is complete, put on the No. 150 grit belt and try to run at right angles to the first operation to save time and to produce a finer finish. Then we move up to the oiling operation with the No. 200 grit belt. Again try to work at right angles, and use No. 2 tallow for your oiling operation. Apply the tallow stick to the belt sparingly but often. This procedure prevents the belt from loading up and scratching. Some operators use tallow on all three operations.

Should you have trouble with bosses or other projections, a polishing compound can be purchased in stick form and applied to small polishing wheels to produce a light head on the wheel. The lathe is turned off, and the compound is applied to the wheel until it comes to a stop. It then is allowed to dry for a few minutes before the wheel is used.

We now have everything polished and greased out, ready for the buffing operation. Actually, we have two operations: Buffing and coloring. Use an 84/92-count buffing

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Electric furnace alloy steel, for the first time shotted in revolutionary vacuum chamber for greater density, eliminating voids and defects. You get a fatigue resisting shot for better, faster cleaning.

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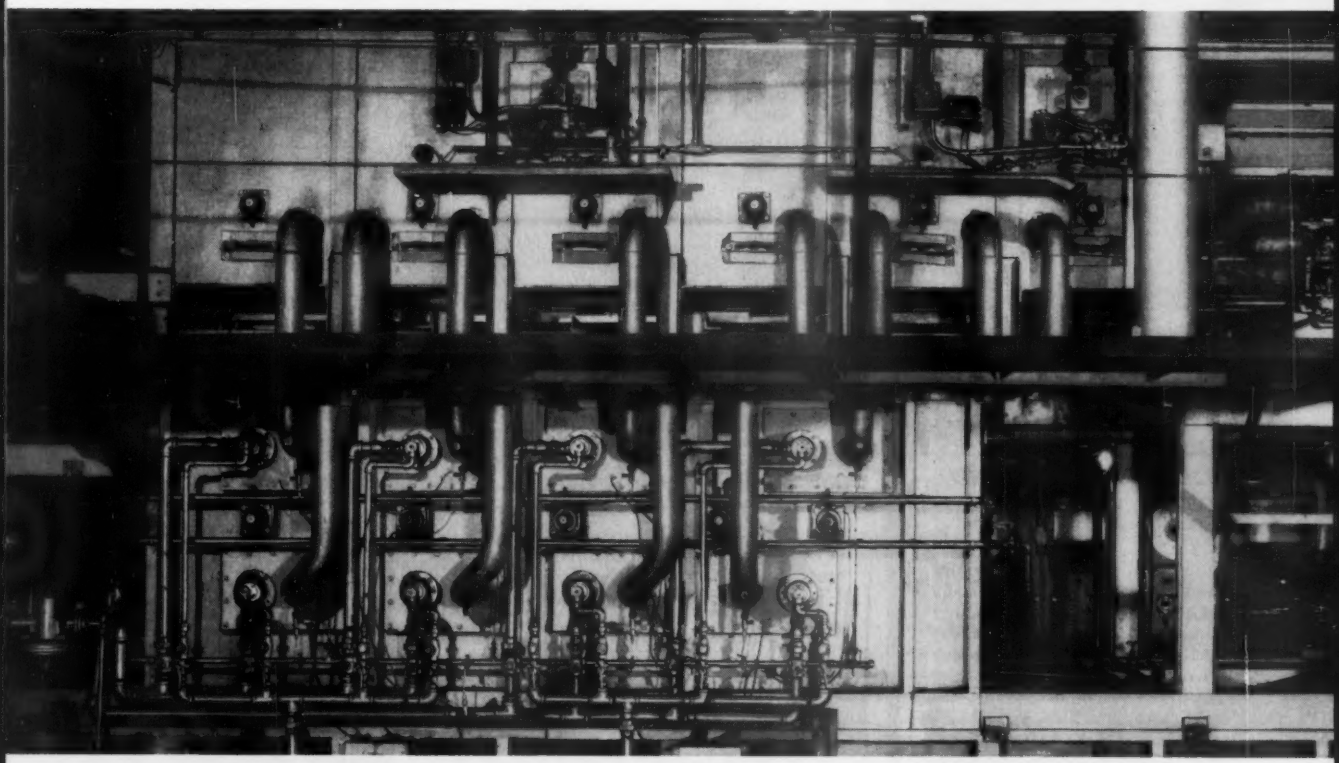

This is one of the new Rotoblast Unit Line Furnaces, the first of their type, with which Pangborn is bringing a new concept of quality to the steel abrasive industry.

Pangborn

See for yourself! Call the Pangborn Engineer in your area or write PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

Rotoblast® Steel Shot

Circle 685 on Page 51

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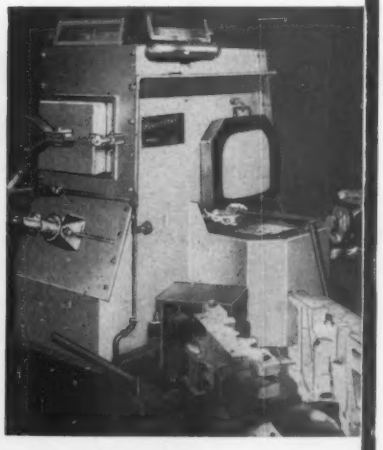

The REVERBALE furnace reduces MELTING AND MAINTENANCE COSTS 66% . . . KEEPS METAL LOSS BELOW 2%!

No crucibles required . . . EASIER CHARGING OF INGOTS . . . waste gases used for pre-heating . . . NO CHILLING OF METAL BATH WHEN ADDING FRESH INGOTS . . . greatest possible flexibility when changing metals.

WRITE NOW for our informative booklet: "International Formula To Cut Melting Costs In ½"

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Circle 686 on Page 51

wheel 16 in. in diam. with ½-in. sewing for castings with round contours. For castings with sharp edges, use a hard, closely sewed buff with ¼-in sewing. Buff the castings using No. 20 tripoli and apply small amounts often. Avoid burning and glazing. A buff that glazes must be raked to give it a new face, and this step is time consuming and costly. Remember, the compound does the cutting, not the buff.

If you choose, you can color by using a 12-in.-diam loose buff and a greaseless, dry coloring compound. Coloring is more of a burnishing operation than anything else. It is, however, that final touch that gives you a fine job. Prior to coloring, you must degrease the castings to get proper results.

Most failures in polishing and buffing are caused by attempts to skip operations. Use a sufficient number of grits to do a good polishing job, and the buffing is easy. Jumping a grit in polishing makes buffing tough. Several composition rubber-polishing wheels are on the market for this work. The abrasive is vulcanized into the wheel throughout so that the wheel continuously exposes fresh abrasive as it wears.

A polishing lathe is a handy item to have around any foundry to check samples, castings, etc. A good practice followed by some shops is to fine polish sections taken from gates and special pieces cast for this purpose. Gas and pinhole porosity stand out like a wart on your nose on a polished surface. One shop I know running large heats for pressure castings polishes a piece 2 x 2 x ¼ in. from every heat.

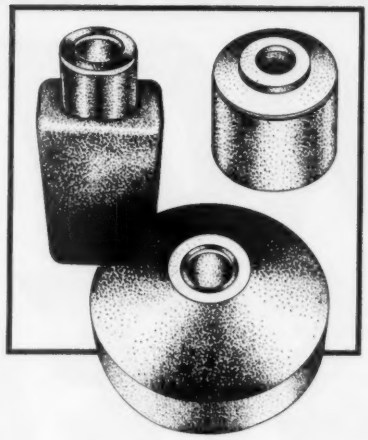
Sincerely,
Charlie

MELTING POT ILLUSTRATIONS

FOUNDRY regrets the omission of credit for source of material used in the Trouble Shooting article, "Melting Pot Life," presented in the October issue. The sketches of typical settings for melting kettles were from a catalog of the C. H. Milles Foundry Co., Chicago, a producer of melting kettles.

ADM Becomes Representative

Archer-Daniels-Midland Co., Federal Foundry Supply Div., Cleveland, has been appointed exclusive representative for the United States Forge & Foundry Co., Pulaski, N. Y., to handle its high-speed core sand muller.



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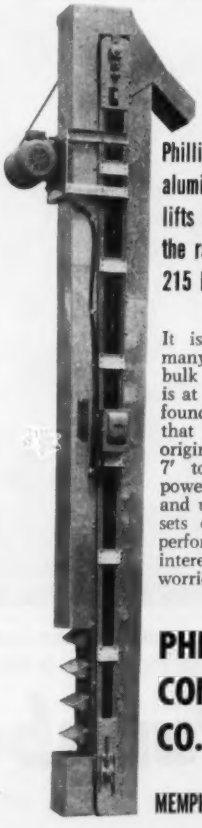


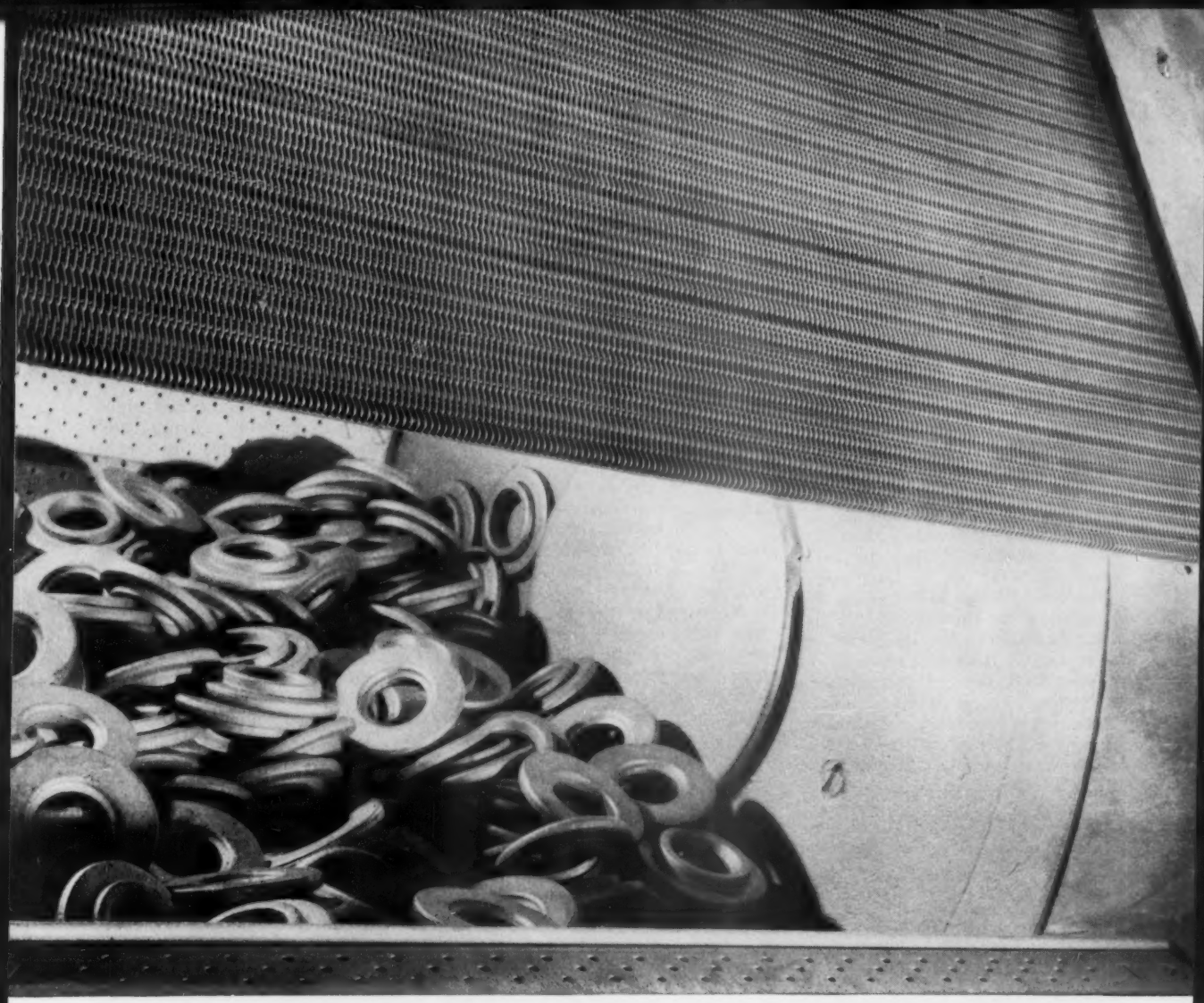
Phillips lightweight aluminum BUCKET-PHIL lifts foundry sand at the rate of 215 F.P.M.

It is used to convey many light and heavy bulk materials, but it is at its best conveying foundry sand, because that is what it was originally designed for. 7′ to 18′ in length, powered by ½ H. P. and up. Ask for some sets of figures on its performance; they will interest you if you are worried about costs.

PHILLIPS CONVEYOR CO.

MEMPHIS, MISSOURI

Circle 679 on Page 51



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Abrasive-tight door on Rotoblast Barrel slashes "lost abrasive" costs

Look at it. That door on the Pangborn Rotoblast Barrel is engineered to prevent waste. Tough woven steel chain construction . . . laminated rubber back . . . edges that roll in mechanical labyrinths—it has to be abrasive-tight! As a result, here is another way that Pangborn Rotoblast Barrels save you money.

This door is just one of the many benefits built into Rotoblast Barrels. Efficient Rotoblast operation, for example. Automatic control. Ease of maintenance. Plus specific construction features that all add up to *better* cleaning in *less* time for *lowest* cost per ton.

Pangborn Rotoblast Barrel for efficient batch cleaning. Available in 1½, 3, 6, 12, 18, 20, 32, 72 and 102 cubic foot sizes.

The Pangborn Engineer in your area will be glad to take off his coat and go to work on your cleaning problem at no obligation. And for complete information on Rotoblast Barrels, write to: Pangborn Corp., *1400 Pangborn Blvd., Hagerstown, Md. Manufacturers of Blast Cleaning & Dust Control Equipment.*

Clean it fast with **Pangborn ROTOBLAST®**

Circle 688 on Page 51

Around the Country

NEWS REPORTS FROM

Chicago . . . Pittsburgh . . . Boston . . . Philadelphia

Pittsburgh— Although they're optimistic about fourth quarter prospects, foundrymen say current operations leave much to be desired. Many were disappointed when September's business fell short of the August level. Inquiries have picked up substantially, but surprisingly few come from the steel industry.

Conditions vary widely from one shop to another. Says the chief sales executive of a large steel foundry: "We'll do better in the fourth quarter than we did in the second or third. For the first time this year we have enough work on our books so that we can schedule operations three months ahead. Sales have improved right across the board. We've had a nice pick-up in our roll business, reflecting the higher level of steelmaking operations."

At another foundry, officials look for a 10 to 15 per cent improvement in fourth quarter sales. The steel mills have decided to take care of deferred maintenance, they believe.

Less confident than its competitors, a third foundry says September's bookings "fell right back to the July level, and October doesn't look any better." It's receiving more inquiries, but most of them come from people who are shopping for lower prices. "We have no backlog at all," a sales manager laments. "Customers delay ordering until the last minute. Then they demand six-week delivery of a job that would normally take us four or five months."

A gray iron foundry wonders why orders from steel mills haven't kept pace with the industry's recovery. Its best customers include tool and die makers, engineering firms that build power stations, automotive companies, and manufacturers of construction equipment.

Chicago—Several Chicago and Milwaukee area high school students were winners in the patternmaking and molding division of Ford Motor Co.'s 1958 Industrial Arts Awards. Their entries in the 12th annual competition were among those included in a special showing of the top prize-winning exhibits in Chicago, Sept. 15.

The exhibits demonstrated high-quality workmanship, ingenuity, and creative design ability of these youths. They told a terrific story of planning, patience, and skill. And a tremendous pat on the back is earned by the instructors who guided the youngsters to their award-winning achievements.

Winner of a first place and $100 went to James R. Nowak, Grade 12, Boys' Technical High School, Milwaukee, for a cylinder head for an air compressor. His instructor was Henry E. Ohly Jr.

A fourth award and $40 was won by Dennis R. Cave, Sandwich High School, Sandwich, Ill., for an aluminum casting.

Honorable mentions and $20 were awarded as follows: William Kwiatkowski, Chicago Vocational High School, Chicago, for a casting of a pulley, Tom Trychta, Shurz High School, Chicago, for a pipe cutter; Robert Sleva, Washburne Vocational High School, Chicago, for a 3-in. gate valve body and coreboxes; William Walters, Bloom High School, Chicago Heights, Ill., for a counterclockwise propeller.

Winning a creative design prize of $50 was Neal Perschke, Beaver Dam High School, Beaver Dam, Wis., for a model gas engine. His instructor was Otto Steinike. Although this entry was in the machine shop classification, the contestant made and machined all of the parts. This involved making all of the patterns, coreboxes, cores, and aluminum sand castings. The engine was 4-cylinder valve-in-head, with 1-in. bore and 1-in. stroke. Displacement was 3.1416 cu. in.

A total of 716 students in grades 7 through 12 shared approximately $50,000 in the awards given annually by Ford Motor Co. Some 40,000 projects, made in public and parochial schools, were entered and 4000 of these were shipped to Dearborn for the final judging.

The program is designed to encourage fine craftsmanship and ingenuity among the nation's young people. Entries in the competition

BACK TO SCHOOL: Prof. James Leach (wearing cap), mechanical engineering department, University of Illinois, supervises Illinois high school teachers as they pour a casting during a five-day workshop held at the school

15-hp Carrier unit expected to pay for itself in year, ON MAINTENANCE SAVINGS ALONE!

The 78′ Carrier Natural-Frequency Conveyor shown here is about to be hit by two giant molds which will be quickly and efficiently conveyed to a shakeout.

This big mid-western foundry had formerly used a 30-hp "slow-advance — quick-return" reciprocating trough conveyor, mounted on rollers. It was a "brute-force" unit and required constant work to keep it in service. The high temperature of the sand and castings (up to 1500°F.) — two-ton shock loads on the rollers — high stress concentration at the drive — and severe abrasive wear in the many moving parts . . . *all contributed to maintenance and downtime costs in excess of $20,000 per year!*

With just *half* the horsepower, the Carrier Natural-Frequency Conveyor does *twice* the job! It handles surge loads as high as 290 tph. An extra-deep trough contains sand "splash" and eliminates spillage. Stress distribution is uniform because the rugged coil springs supporting the trough are evenly spaced, thus preventing fatigue failure of structural members. And Carrier's patented drive, which is available in NO OTHER CONVEYOR, *permits the conveyor to settle under load so that shocks from 2-ton dumps are not transmitted to the drive bearings!*

Write direct for further information. Address: Carrier Conveyor Corp., 225-A N. Jackson St., Louisville 3, Ky.

CARRIER
NATURAL-FREQUENCY®
CONVEYORS

Circle 689 on Page 51

must be made in school classes under instructor supervision, and the range of the program's 14 divisions enables nearly any school-made project to be eligible.

Figures cited by Don Healas of Ford's Educational Affairs department a couple of years ago testify to the caliber of participants in the competition. National average of high school graduates entering college has been about 21 per cent. Of winners in the Ford Industrial Arts program, it was said 46 per cent go to college and 85 per cent follow in the fields in which they won their awards. Exact new figures are not available but the latter two percentages now appear to be on the low side.

Boston— Ferrous foundry operations in the fourth quarter will be at the highest level this year, although substantially short of capacity. Gray iron and malleable shops have increased to five-day schedules in more cases, but without full crews.

Improvement in demand for castings since September has been gradual but well diversified. Low inventories of castings, coupled with moderate improvement in general business, account for the mild bulge with an increase in backlogs for November. Competition keeps down prices, but cost of major raw materials is steady.

Mystic Iron Works furnace resumed blast Nov. 1, having been down since July 1. E. W. Zimmerman, vice president, emphasizes that return to production was prompted by need to replenish inventory in certain grades rather than an outstanding increase in demand for iron, although shipments have been heavier. Everett furnace has substantial stock of most grades.

Several malleable shops in Connecticut have gone to five-day schedules and deliveries have been extended slightly. Machine tool industry, slow through first three quarters, is showing spotty improvement, and in some cases shops supplying castings are pouring more metal. Textile mill equipment shops continue to be curtailed, although several are estimating jobbing tonnage to help take up the slack. Demand for rough castings for highway drainage work such as catch basins and miscellaneous parts is heavier.

Both steel and nonferrous shops, notably captive units, are operating somewhat higher than gray iron and malleable units, but none is at capacity. Valve producers and meter manufacturers have slightly heavier orders. Most aluminum castings produced in this area are small, but there is a mild pickup in demand. Shipyard and power plant demand holds steady.

The Sargent Foundry Co. one-cupola iron foundry, Randolph, Vt., is being liquidated with machinery, including machine shop, sold.

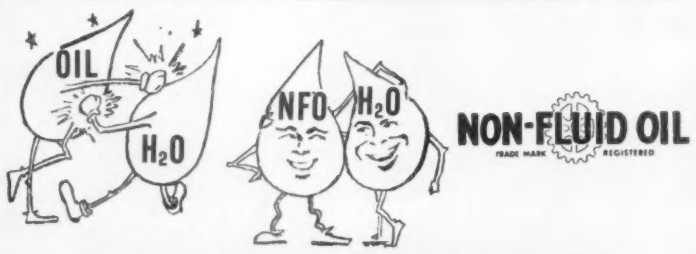
Philadelphia— Gray iron production is increasing slowly. Few shops are doing better than 50 per cent of normal, and some are not doing that well. Where gray iron foundries are operating as much as five days a week, they are doing so with restricted forces. Holding up best perhaps are inquiries for construction castings and requirements for power transmission equipment and food processing machinery. Paper and textile machinery requirements still lag.

Jobbing foundries report not only poor demand from machine tool builders, but competition from the latter's captive shops. On the other hand, inquiry from packaging machinery manufacturers is somewhat better.

Malleable shops appear to be doing best of all the ferrous foundries. They are operating four to five days a week, with backlogs expanding. At least one malleable producer is quoting deliveries of six to eight weeks. Demand for pipe fittings, building hardware, and electrical equipment components is holding up well, with consumers beginning to pay more attention to inventories than heretofore.

Steel casting demand is a little more active, although shops are not averaging much more than 65 per cent of normal, it is estimated. Improvement is noted in valves, heavy truck parts, gearing, and ship work. But over-all it is still a spotty situation.

Aluminum foundries are moderately active, with business up from a month ago. Requirements for household durables and airplane needs are noteworthy. Business with the independent bronze and brass shops remains poor, with three days a week or less. Captive shops, engaged in such lines as meters, industrial pumps, ship propellers and plumbing, are more active, although few, if any, have reached a point where they are farming out work.



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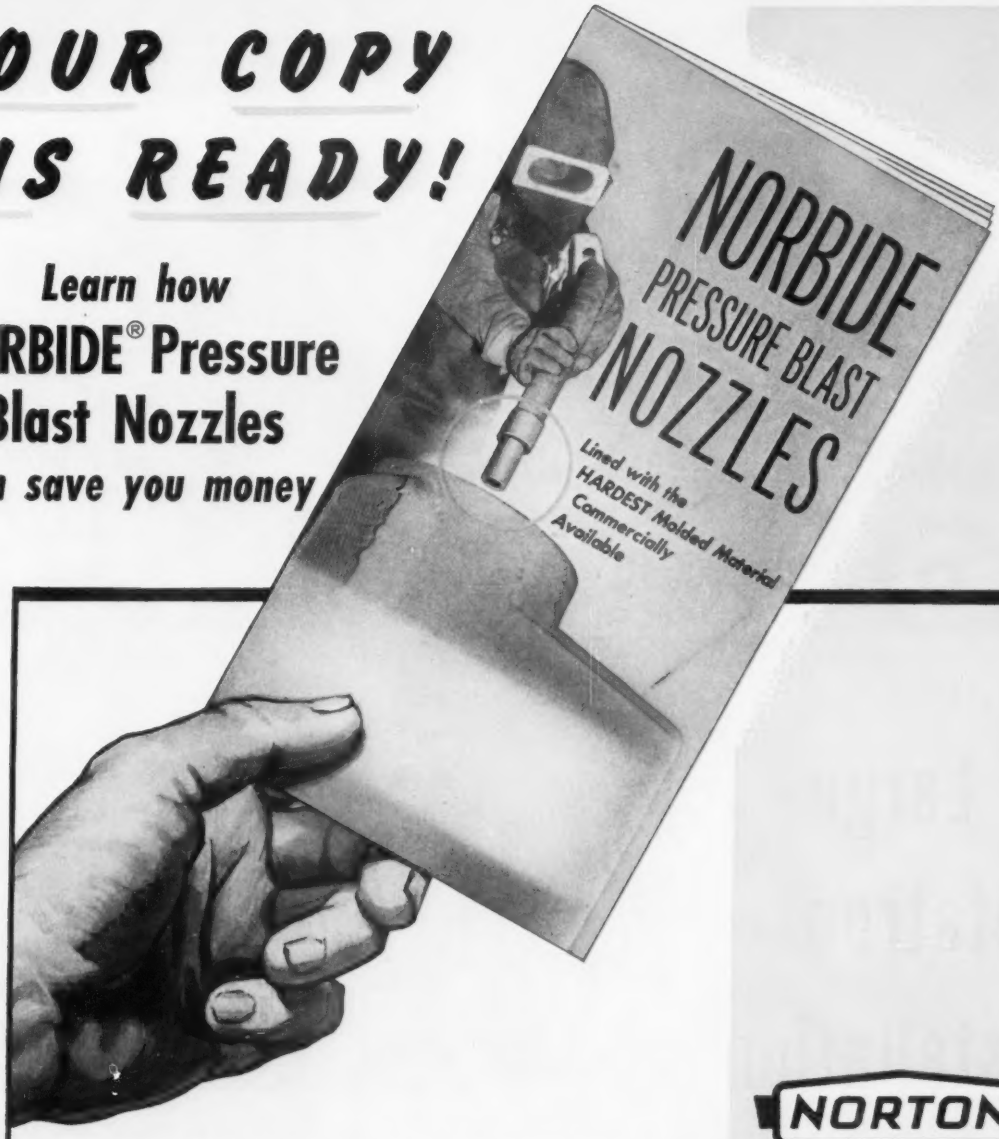

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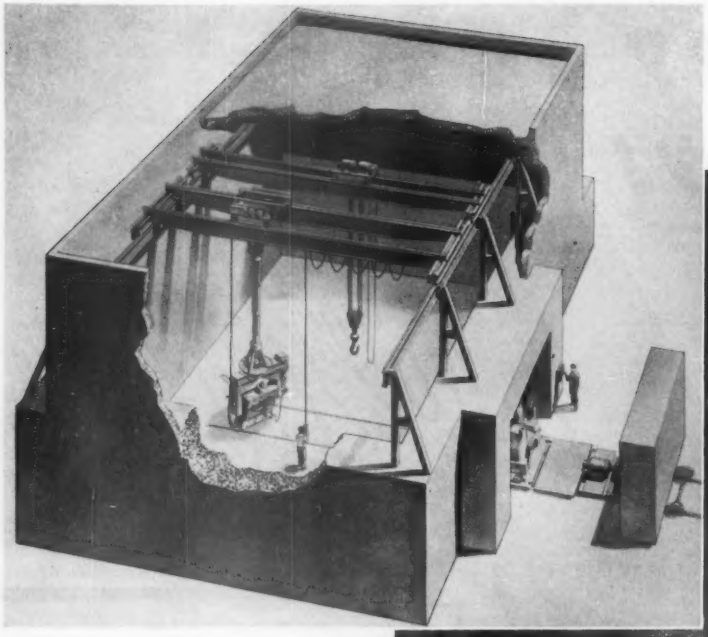
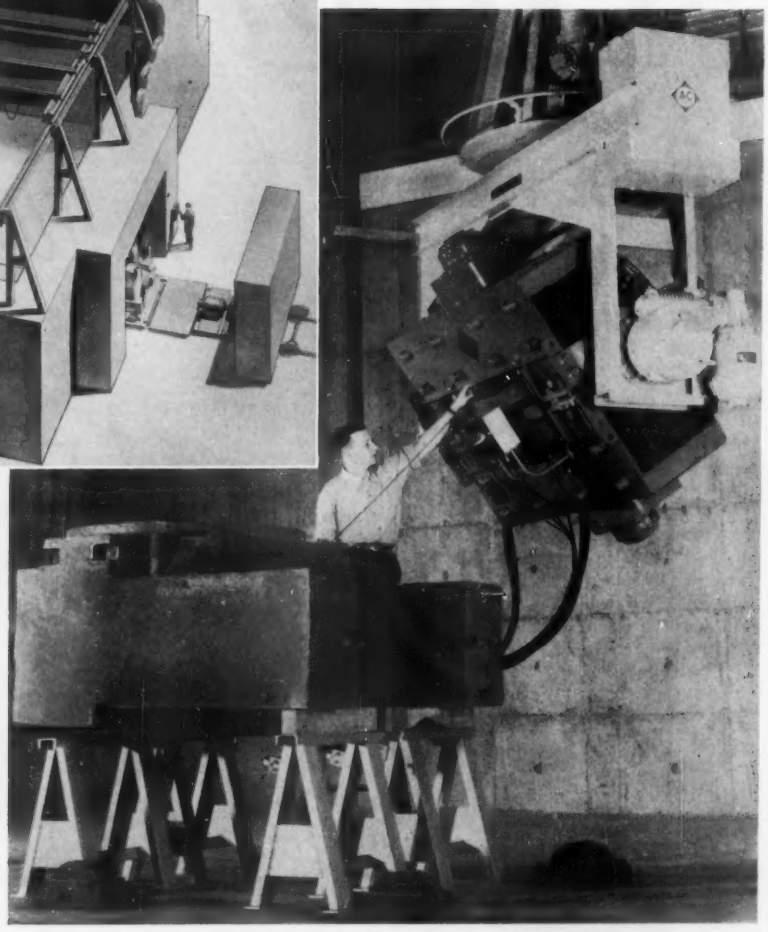


Opening and closing of the 85-ton solid concrete door to radiography building is controlled by man at a pushbutton panel



Large Betatron Installation

Employs 85-Ton Door

X-rays pass through casting sections to a film. A technician measures distance of betatron from film for proper setup

A 24-million volt betatron recently installed at the New Castle, Pa., plant of Mesta Machine Co. radiographs an 8-in. section of cast steel in 1½ minutes and a 10-in. section in 4 minutes. The unit stands behind what is said to be one of the largest mobile pieces of concrete in the world, an 85-ton solid concrete door 13½ ft high, nearly 18 ft wide, and 5 ft thick.

Flexibility and mobility built into the facility permit speedy x-ray inspection of a wide range of casting sizes, shapes, and weights. Steel parts weighing 50 tons or more can be brought through the door on special platform cars which run on track from a point 30 ft outside the radiography chamber. Several cars are linked together rigidly to form a single, electrically driven unit with the lead car supporting the door.

In use, the betatron detects flaws before expensive machining and also acts as a design tool. Radiographic inspection shows which risers can be reduced and where sections can be lightened safely.

After a casting has been transported by crane from the nearby foundry building and placed on cars, the cars and the great door are driven toward the radiography building. It takes less than one minute to position the casting in the chamber and close the door. Limit switches automatically control the position of the cars.

The betatron, which is a product of Allis-Chalmers Mfg. Co., Milwaukee, is suspended by a crane-mounted telescoping tube. This arrangement speeds preparation for exposure by permitting technicians to move the betatron to various positions without the need to move

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Circle 702 on Page 51

castings. Pieces under 10 tons can be moved within the chamber by an auxiliary crane.

Operating personnel enter and leave through a door at the rear that leads to the betatron control panel, film developing facilities, and a viewing room. Electrical interlocks on the entrances shut off betatron power should anyone inadvertently attempt to enter while the unit is operating.

Other Allis-Chalmers betatron installations are in operation at Continental Foundry & Machine Co., at both East Chicago, Ind., and Coraopolis, Pa.; General Steel Castings Co., at both Eddystone, Pa., and Granite City, Ill.; Ohio Steel Castings Co., Lima, Ohio; Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; Pittsburgh Steel Foundry Corp., Glassport, Pa.; Bonnev-Floyd Steel Castings Co., Columbus, Ohio; and Electric Steel Castings Co., Portland, Oreg.

In addition to its industrial applications, the betatron is used in hospitals and universities for medical and research purposes.

Completes Plant Modernization And Expansion Program

Chicago Hardware Foundry Co., North Chicago, Ill., has added a new aluminum and brass foundry plant as the third step in the program of expansion and consolidation of its nonferrous operations. Covering 8000 sq ft of floor space, the building is being completed a year ahead of schedule. The first two stages of the program added a new aluminum molding and melting building, a new $100,000 building for receiving, casting, finishing, and shipping of nonferrous metals, and the installation of new equipment.

"He cast himself what I call a real pair of safety shoes"

MILWAUKEE COKE SOLVAY

For Over Half a Century the

Highest Quality Foundry Coke

Consistently high in carbon and low in sulphur and ash . . . highly resistant to shatter and abrasion, Milwaukee Solvay has hundreds of satisfied users. It has remained the foundryman's choice for *over 50 years.*

If you are not already a user, may we ship you a *trial* car?

SERVICE DEPARTMENT AVAILABLE WITHOUT OBLIGATION

Serving Industry Since 1883

P M

PICKANDS MATHER & CO.
CLEVELAND 14, OHIO
Chicago • Cincinnati • Detroit • Duluth
Erie • Greensboro • St. Louis • Washington

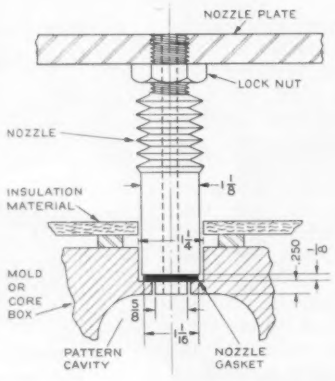
IRON ORE • PIG IRON
COAL • COKE • FERROALLOYS

Circle 703 on Page 51

The Shakeout

Plastic Gaskets Resist Heat and Pressure

IN TESTS made by C & S Products Co., Detroit foundry equipment manufacturer, laminated plastic gaskets withstood temperatures up to 500° F and pressures up to 15,000 psi. The gaskets are made with woven glass fabric bonded with silicone resin. They are produced by Taylor Fibre Co., Norristown, Pa.



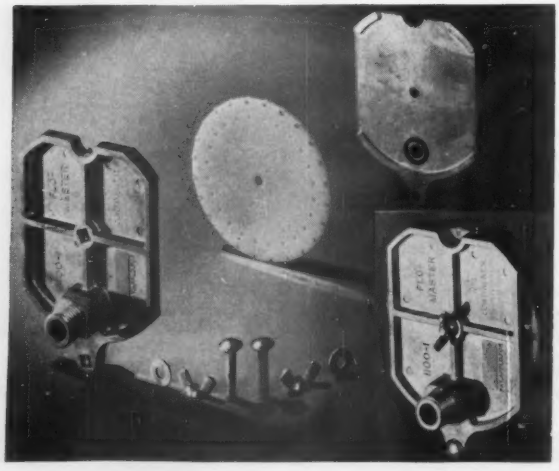
The tests were made by C & S in connection with the development of a machine for making shell molds and cores. The sand and phenolic resin mix is fed by gravity from a hopper into the blowhead and is forced by air through nozzles into the heated cavity where the shell is molded. A gasket at the bottom of each nozzle acts as a seal to prevent metal-to-metal contact and also as a barrier to stop heat transfer from the cavity to the nozzle.

The pressure on the gasket comes from a lift cylinder which raises the hot box or cavity against the nozzles, as shown here. The gaskets therefore must have high compressive strength as well as superior heat resistance to function properly.

For More Details Circle No. 518—Page 169

Diecastings Simplify Design of Metering Unit

BECAUSE the product was completely new, designers of a unit to regulate flow of ammonia into irrigation water for fertilizing purposes were unhampered by considerations of traditional methods or materials. This freedom led B.C.G. Mfg. Co., Phoenix, Ariz., to an assembly consisting basically of just two purchased components—an aluminum diecasting and a nylon disc. With two bolts and wing nuts, the disc is sandwiched between two of the diecastings.

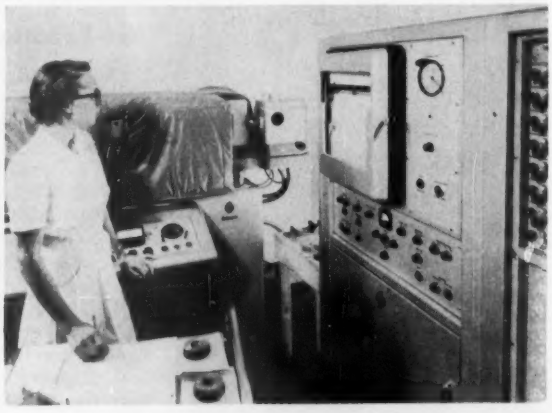


The metering units are said to be maintenance-free and nonclogging. A series of 24 orifices of varying sizes is machined in the nylon disc. When the wing nuts are loosened, the disc can be rotated to bring the desired orifice opposite the cast inlet and outlet projections on the diecastings. Choice of orifice is determined by tank pressure and the amount of ammonia required. With the meter set for the correct orifice, the unit can be forgotten. There are no pressure gages, diaphragms, or springs to cause failure.

For More Details Circle No. 519—Page 169

Direct-Reading Spectrograph Speeds Analyses

ACCURATE CHEMICAL ANALYSES of steel alloys are obtained in less than 2 minutes with a direct-reading spectrograph at Electric Steel Foundry Co., Portland, Oreg. The unit was made especially for Esco's needs by Applied Research Laboratories and is capable of measuring as many as 22 different elements in an alloy simultaneously.



With the direct reader, metals can be analyzed accurately while still in the furnace. Corrections can be made before the heat is poured, thus enabling positive, at-the-furnace control for alloying steels.

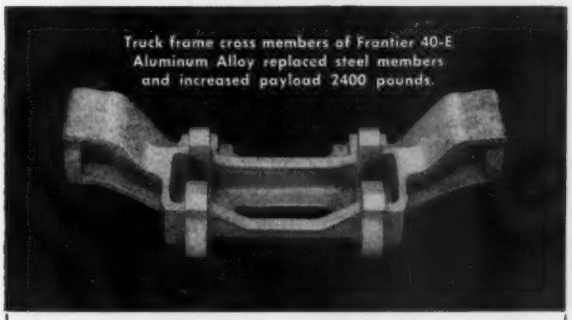
In operation of the device, a metal sample is "sparked" with a carbon electrode. The light passes through a system of mirrors onto diffraction grating to photo-multiplier tubes. It is converted into an electrical charge temporarily stored on a bank of condensers.

At the conclusion of the 45-second sparking period, a computer discharges the bank of condensers and quantitatively displays these electrical charges on a graph recorder. With a conversion chart, a value can be obtained as to the amount of any element in the alloy.

For More Details Circle No. 520—Page 169

MORE PROFIT... for Both User and Producer

when you sell **FRONTIER 40-E** Aluminum Alloy CASTINGS!



Truck frame cross members of Frontier 40-E Aluminum Alloy replaced steel members and increased payload 2400 pounds.

Sell Castings ENGINEERED TO THE JOB— Sell Customer Service

When customers ask for light weight castings, don't just think of aluminum. Do a selling job. Ask about strength requirements. Would shock resistance be an advantage? How about corrosion resistance? Must the casting withstand high pressure? Talk about weldability and machinability.

Then recommend Frontier 40-E, the self aging, high strength aluminum alloy that has all these desirable features. Being a primary ingot, it is more reliable and can be counted on to give the same results day after day — year after year.

Do more than offer just another casting. Get out of the rut. Offer better castings with better design factors — castings made of Frontier 40-E — formulated to give 25,000 lb. yield strength. We'll back you up with our complete engineering and laboratory service. We'll start you on the road to *more and better* casting business.

Write for complete information today.

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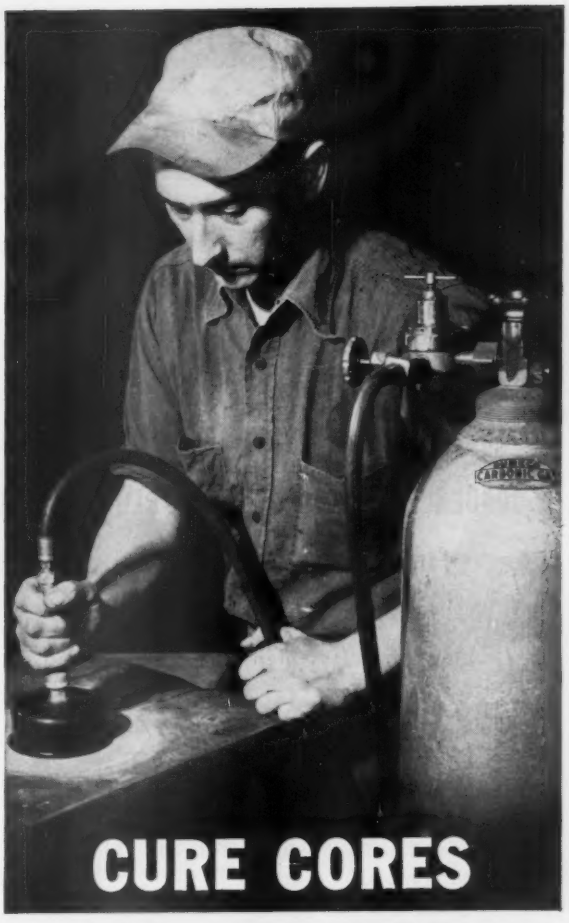
Exclusive Foreign Producers of 40-E
Daralum Castings Ltd., Darlington, England
Paul Bergsoe & Son, Glostrup, Denmark
L'Aluminum Francais, Paris, France

Circle 705 on Page 51



CURE CORES IN SECONDS— USE PURECO CO_2

Use Pureco Carbon Dioxide to cure *large or small* cores and molds.

You eliminate costly oven equipment and operation — save cost of driers — save on core handling time — save on storage space, since cores set in seconds and can be used immediately. You cut down rejects.

Your Pureco representative will be glad to arrange for a demonstration of the CO_2 process in your plant or supply you with further information at no cost or obligation to you.

Contact your nearest Pure Carbonic office today or write the address below requesting Bulletin #27.

PURECO CO_2

Pure Carbonic Company
A Division of Air Reduction Company, Incorporated
150 EAST 42ND STREET, NEW YORK 17, N. Y.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT

Circle 706 on Page 51

For speed and convenience

MOROC®

the controlled silicate CO_2 binder

A GRADE FOR EVERY FOUNDRY REQUIREMENT

MOROC ❶ High-strength binder for ferrous and nonferrous molds and ladle linings.

MOROC ❷ For medium-sized and large molds and cores. Has high-strength and good collapsibility.

MOROC ❸ High-strength, high-collapsibility binder for ferrous and nonferrous cores, can be used in core blowing equipment.

MOROC ❹ Binder with extra-high collapsibility, especially well-suited for core blowing equipment.

Available in tank cars, tank trucks, 55-gal. drums, 5-gal. cans.

MOROC CORE PASTE—For joining sections of silicate bonded cores. Fast drying, gives a high-strength bond in minimum time. Supplied in 55-gal. drums, 5-gal. pails.

FOR INFORMATION CALL YOUR NEAREST DIAMOND ALKALI SALES OFFICE

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Diamond Alkali Company, Cleveland 14, Ohio

Diamond Chemicals

Circle 707 on Page 51

DURA STIX

- TIME TESTED
- ECONOMY
- DURABILITY

...SUPER QUALITY REFRACTORY CEMENT

DURA-STIX SUPER QUALITY CEMENT, with an absence of grit, permits Fire Brick to be laid to hair-line closeness, providing an absolutely airtight joint.

Use DURA STIX on dry sand molds, as a core wash and as a protective coating on wood bottom boards. Hundreds of other uses!

DURA-STIX means time-proven economy. May we show you how? . . . Main office in New York; representatives in Boston, Philadelphia, Chicago and Grand Rapids, Michigan.

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KEYSTONE REFRACTORIES CO.
INCORPORATED
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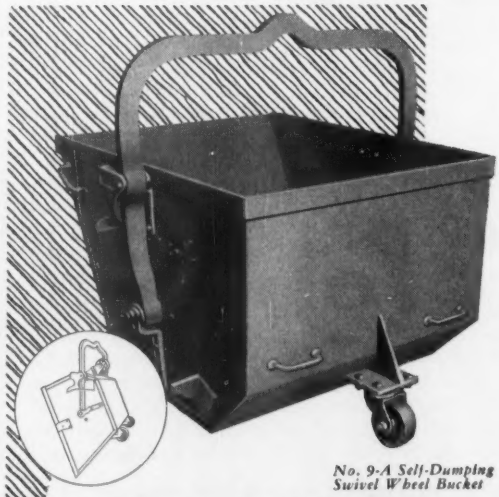
Circle 708 on Page 51



No. 9-A Self-Dumping Swivel Wheel Bucket

PENN BUCKETS...

Careful balancing makes Penn Buckets self-dumping when loaded and self-righting when empty. Welded construction prevents "clinging", makes them empty easily and completely. The swivel wheel increases handling efficiency, too.

WRITE TODAY FOR NEW BULLETIN AND DIMENSION SHEET

PENN IRON WORKS, INC.
READING, PENNA.

Circle 709 on Page 51

Plane smooth, accurate patterns with this compact 24" Oliver

Takes stock 24" wide, 8" thick

Easy to adjust and operate

This popular precision-built Oliver Surfacer is found in many pattern shops. It smoothly planes stock at any rate from 15′ to 60′ a minute at the turn of a dial. All controls conveniently located. Revolving parts enclosed for safety and exclusion of dirt. Built-in knife jointing and grinding rigs. Write for Bulletin 299.

Oliver makes Millers, Lathes and other Woodworking Machines for pattern shops

OLIVER SINCE 1890

OLIVER MACHINERY COMPANY
Grand Rapids 2, Michigan

Circle 710 on Page 51

REJECTS and SCRAP due to gas are practically eliminated by . . . Model 400 VACUUM DEGASSING CHAMBER

A compact, easily operated, entirely integrated foundry unit thoroughly degasses both ferrous and non-ferrous molten metals in a few minutes.

Complete package unit — requires no process changes — occupies small floor space — no special foundation — easily moved — requires no special experience or training.

Ruggedly built for foundry service.

This Vacuum Degassing Unit permits profitable operation from the first day. Write for illustrated bulletin.

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The punishing impact of cleaning and peening operations calls for a metallic abrasive that can stand up and be counted.

The Blastrite line does that and more, simply because it's produced to consistently rigid specifications.

We have a small plant but we have large ideas about quality. You get guaranteed quality when you get Blastrite shot and grit.

Write for our catalog or outline your metallic abrasive requirements to our nearest representative.

Packaged the way you want it.

BUY BLASTRITE!

Steel • Pearlitic Malleable
"A" Iron • "B"
Chilled Iron • Drawn Steel

ABRASIVE SHOT & GRIT COMPANY
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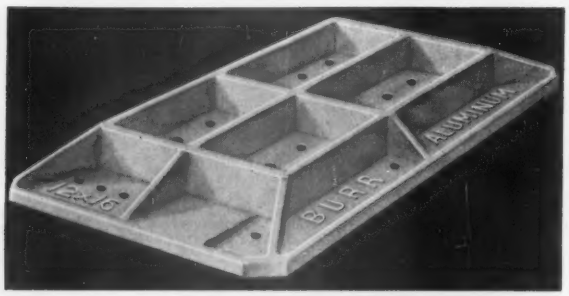
Circle 711 on Page 51

Circle 712 on Page 51

BURR ALUMINUM BOTTOM BOARDS
IMPROVE CASTING QUALITY



STURDIEST POSSIBLE MOLD FOUNDATION

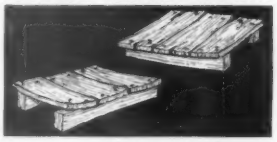
- Can't Warp, Swell, Twist, Burn or Come Apart
- Eliminates Cracked Molds—reduces rejects
- Strong—Rigidly Bridged—Lightweight—One Piece

Better castings are produced on Burr Aluminum Bottom Boards with fewer rejects caused by cracked molds, swells and inadequate venting.

240 STOCK SIZES assures QUICK DELIVERY

Write Today for prices and samples

KILL THESE WRECKERS OF QUALITY



BURR ALUMINUM PRODUCTS
P.O. BOX 61 BURR OAK, MICHIGAN

Circle 713 on Page 51

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.
Manufacturers of Pneumatic Tools Since 1903
DAYTON, OHIO

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Some of the Many Foundries utilizing Euclid Cranes . . .

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Kasper Foundry
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are FAVORITES in FOUNDRIES

EUCLID thinks, designs and builds foundry cranes with dust proof mechanisms that withstand abrasive, corrosive conditions.

Push-button, rope pendant floor control and overhead cab operation incorporate the latest design improvements for precise load control at all times.

EUCLID SERIES H HOISTS are available in capacities up to 10 tons.

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Circle 715 on Page 51

COB FLOUR

greatly increases sand flowability. U. S. standard screen analysis: 40-200. Also COB GRITS *and* COB MEAL *for blasting and tumbling.*

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Circle 716 on Page 51

TEX-VENT
Flexible TEXTILE Core Vent

New venting material for sand cores. Disintegrates completely if core is baked . . . leaves no residue. Allows unrestricted use of cold-setting processes.

DOMESTIC Industries inc.
470 W. Broad St. Columbus, O.

Circle 717 on Page 51

NON-FERROUS FOUNDRY METALLURGY

By A. J. Murphy

Covers the general principles unifying foundry techniques of all industrial nonferrous metals in relation to metals in the liquid state to the process of solidification and to the factors influencing properties of casting. Other materials include the part played by gas dissolved in liquid metals, its control and its influence on cast products; factors influencing the grain size of castings, and mechanical properties of castings as complete components compared with the properties in conventional test samples.

497 pages Price $12.50 Postpaid

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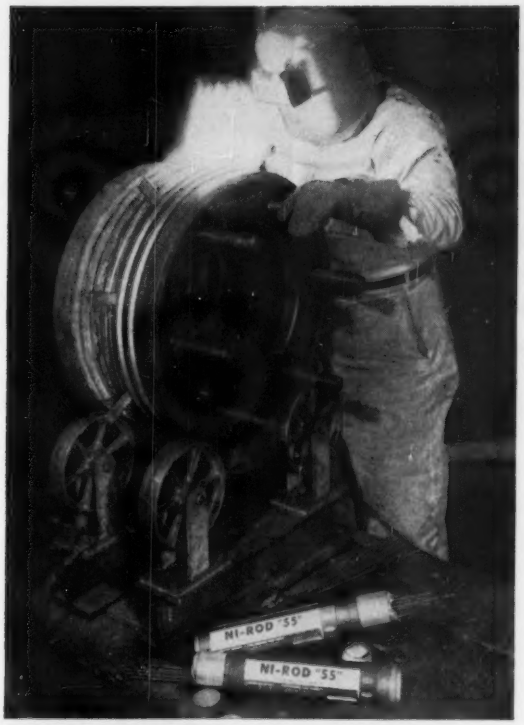
1213 W. 3rd St., Cleveland 13, Ohio



How Ni-Rod "55" builds up worn cast iron... keeps repair cost down

When the owners of the M V Sunprincess heard it would cost them over $7,200 to replace all six worn ship pistons, they quickly called in J & R Weir Ltd., Marine Engineers, Montreal.

These engineers in turn recommended a Ni-Rod "55"* repair job — welding to be done by Welding Engineers Ltd., Montreal.

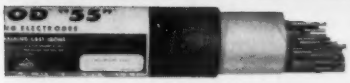
Wear ran as high as 1/8 inch on some of the piston ring grooves. But with Ni-Rod "55" Electrodes, weldors soon had all six pistons back in the ship at a total cost of $2,450 — a saving of over $4,750.

For your jobs

Ni-Rod "55" can be used to build up worn areas in almost all cast iron parts. Auto, truck, or ship pistons . . . valve seats . . . cylinder walls . . . are just a few. And the cost is just a fraction of what replacement would cost. What's more, with Ni-Rod "55", the repair is done quickly and easily. Welds are strong, sound, highly machinable.

Write for "Repair Cast Iron Parts Quickly and Easily" for the complete Ni-Rod "55" story. *Registered trademark

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street — New York 5, N. Y.



INCO WELDING PRODUCTS
ELECTRODES • WIRES • FLUXES

Circle 718 on Page 51

GLUTRIN
LIQUID BINDER

GOULAC
DRY BINDER

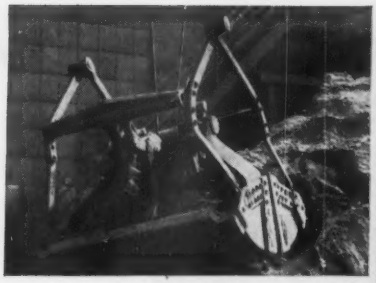
For
CORE WORK, SAND FACINGS, SPRAYS

Write for pamphlets giving detailed information. Both materials carried in stock by America's foremost foundry jobbers

ROBESON PROCESS COMPANY
(Established 1905)
GENERAL OFFICES AND PLANT: • ERIE, PA.

Circle 719 on Page 51

Blaw-Knox single line type buckets improve foundry handling operations



Unusually low headroom requirements are provided for by the application of symmetrically designed, extremely low headroom types of single line buckets.

Blaw-Knox single line, hook-on type foundry buckets are especially designed for efficient operation under all types of headroom conditions. In addition, their quick—detachable feature permits the bucket to be released instantly, freeing the crane for other duties. Special shark-tooth types are available for handling coke with a minimum of degradation.

Blaw-Knox sales engineers can study your requirements and apply the bucket best suited to your needs.

Normal headroom usually accommodates standard Blaw-Knox Foundry Buckets of either the open head or closed head types.

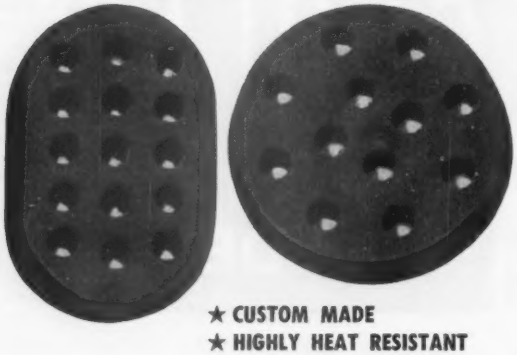
BLAW-KNOX COMPANY

Blaw-Knox Equipment Division
Pittsburgh 38, Pennsylvania

BLAW-KNOX

Circle 720 on Page 51

STRAINER CORES



★ CUSTOM MADE
★ HIGHLY HEAT RESISTANT
★ LOW COST

Exclusive characteristics of **RUDOW STRAINER CORES** makes it possible for you to substantially cut your costs. Moreover, our prices can compete whether you have a supplier, or make your own strainer cores.

RUDOW STRAINER CORES now make it economically wise to convert your present complex gating jobs to the simplified use of our strainer cores.

Prove to your satisfaction that **RUDOW STRAINER CORES** will reduce reject losses and keep castings free of oxides, slag, and other impurities by controlling the flow of metal into the mold.

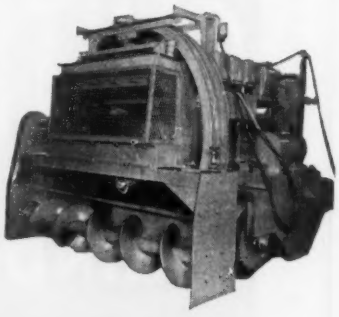
We invite you to prove our claim by allowing us to furnish free samples of **RUDOW STRAINER CORES**

RUDOW MANUFACTURING COMPANY
2602 Venice Rd. P.O. Box 2121 Sandusky, Ohio

Circle 721 on Page 51

NOT JUST A SAND CUTTER!

The Ringlift Sand Conditioner picks up sand from floor, screens it, magnetically removes scrap, aerates, cools and adds moisture, then lays it down in a neat windrow. One man operated. Clean, quiet, efficient. Quickly returns its cost. Owners wouldn't part with them. Send for Bulletin.



STATES ENGINEERING CORPORATION
920 W. Berry St.
Fort Wayne, Indiana

Circle 722 on Page 51

FOUNDRY

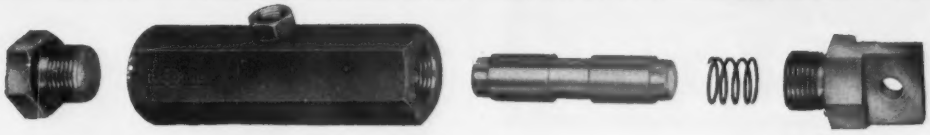
EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

MECHANIZATION

Circle 723 on Page 51



3 steel alloys*

Give Branford vibrators longer life

Strength and durability are built in . . . preserved . . . through specific steel alloys that give each part of each Branford Vibrator the properties it needs for a long serviceable life.

Branford Pistons are built from hard, chrome-coated steel, especially wear resistant to maintain efficient precision over long periods of use.

Springs made from high tensile, flexible steel flex themselves millions of times without fracture . . . without fatigue.

Branford body steel is rugged, tough, ready to take the torture and stress of vibration without breaks, cracks, and without frictional wear.

When you specify "Branford Vibrators" you receive unmatched performance, longer service, less down time.

Write for your Branford catalog and the name of your local Branford distributor.

*** Branford Vibrators are built in every size—and in every size they are built from steel throughout (including the bodies).**

THE BRANFORD COMPANY 130 CHESTNUT STREET — NEW HAVEN, CONNECTICUT

Circle 724 on Page 51

EMPIRE*

"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION

2201 First Ave., North • Birmingham 3, Ala.

Phone: ALpine 1-9135

*Reg. U.S. Pat. Off

Circle 725 on Page 51

MURPHY PISTOL SPRAYER

Forces blackening into pores and pockets of molds. Sprays Silica wash, oil, or water equally well. Use it also to sand blast or as a blow gun.

Standard of the foundry field for over 50 years. Stocked by leading foundry supply houses. Guaranteed by . . .

2673

JAMCO

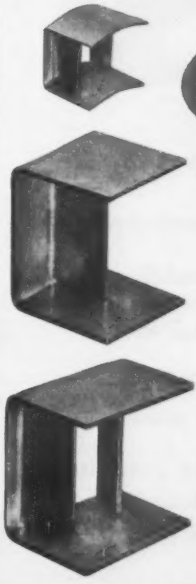
JAS. A. MURPHY & CO., INC.

1425 EAST HIGH STREET, HAMILTON, OHIO

Circle 726 on Page 51

WHY POUR YOUR PROFITS AWAY?

save up to 50% on chaplets



Buffalo ECONOMY CHAPLETS

Now you can save up to 50% on chaplet costs with Buffalo Patented Angle Stem and Double Angle Chaplets. They burn in more easily, without chilling. They are thoroughly coated to assure instant fusion with molten metal. And the unusual strength of the one-piece design permits fabrication in thinner gauges. All these features mean *savings to you.*

Furnished in a complete line of sizes and gauges, Buffalo Economy Chaplets are available in tinned steel, Monel, stainless steel and copper. Why not give them a trial? It costs only pennies to find out how many dollars you will save.

Write for literature on Economy Chaplets. For information on the complete "Buffalo" line, request Catalog No. 20.

MANUFACTURED BY

Combined SUPPLY & EQUIPMENT CO., INC.

211 Chandler St., Buffalo 7, N. Y.

Circle 727 on Page 51

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.

ORWELL, OHIO • U. S. A.

SALES • SERVICE • STOCK • COAST TO COAST

Circle 728 on Page 51

Are You Looking

for

Machineability?

Chemical inertness?

High thermal conductivity?

High temperature stability?

Resistance to thermal shock?

. . . then consider GRAPHITE — it has many unique qualities.

We are specialists in graphite specialties. Our technicians will be glad to work with yours.

ELECTRODE GLC DIVISION

GREAT LAKES CARBON CORPORATION

18 EAST 48TH STREET, NEW YORK 17, N.Y.

Think carefully: Have you seen this man anywhere around your plant?

His name is WILLIS JOSEPH HAMILTON, and he's

WANTED FOR MURDER

WILLIS JOSEPH HAMILTON is being sought by the FBI for unlawful flight to avoid prosecution for the crime of murder. Hamilton has been employed in foundries and by manufacturers of steel products, and may seek employment or already be employed in such industries.

On June 26, 1953, Hamilton is alleged to have shot and killed one William H. Goolsby in a Cleveland, Ohio, restaurant following an argument over the payment of a check. A complaint was filed before a U.S. Commissioner at Cleveland, Ohio, June 29, 1953, charging Hamilton with a violation of Title 18, U.S. Code, Section 1073, in that he fled from the State of Ohio to avoid prosecution for the crime of murder.

Hamilton uses several aliases: Joe Brown, Thomas Collins, Jimmie Dale, Willie Foster, William Hamilton, Willie Hamilton, John Tabot, Joe Talbert, John Talbert, Joseph J. White, James Williams, John Williams, Joseph Whyte, Joe Whyth.

This fugitive has escaped from confinement on numerous occasions. He reportedly carries a .45 caliber automatic under his left shoulder in a shoulder holster. He reportedly practices drawing this automatic while pretending to reach for cigarets. He reportedly has another automatic pistol in his possession. Accordingly, he should be considered armed and dangerous. Hamilton has been convicted for robbery, highway robbery, armed robbery, and breaking and entering to commit a misdemeanor. Fugitive was born April 16, 1902, St. Augustine, Florida; height, 5'7"; weight, 160 lbs.; build, medium; hair, black graying, kinky; eyes, brown; complexion, medium brown; race, Negro; nationality, American. Occupations, laborer, steel foundry worker, chauffeur. Scars and marks: small cut scar running into and above right eye; small cut scar above left eye; cut scar right edge of nose; 1" scar left side of face near ear. Has several gold-capped teeth, large vaccination outside upper left arm, large cut scar on back of right hand near base of index finger. Hamilton is said to drink to excess and has an ungovernable temper. He is an accomplished trumpet player and occasionally wears a mustache.

Any person having information which might assist in locating this fugitive is requested to immediately notify the Director of the Federal Bureau of Investigation, United States Department of Justice, Washington 25, D. C., or the SPECIAL AGENT IN CHARGE OF THE NEAREST FBI DIVISION. . . . the telephone number is on the first page of your local telephone directory.

This space contributed by FOUNDRY as a public service.

CLASSIFIED ADVERTISING

Help Wanted

CORE DEPARTMENT FOREMAN

For well known, progressive foundry in Up-State New York producing Steel, Gray Iron and Nonferrous castings. Must be capable of supervising 12 men for maximum efficiency and have complete knowledge of rigging equipment for blowing cores and making shell cores. Must be capable of reading blueprints and estimating core production. Must also be well versed in the production of oil sand as well as CO_2 cores. Excellent opportunity for right man. Write giving full details of personal background, past experience and salary expected.

BOX 243, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

METALLURGIST

Approximately 40 years of age for large Eastern nonferrous foundry. Experience in aluminum bronze alloys essential. Write giving complete qualifications and salary expected.

BOX 233, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY CONSULTANT

Technical and experienced in glass mold cast gray iron. Preferably available to spend one or two months in Monterrey, Mexico.

FABRICACION DE MAQUINAS, S.A.
APARTADO POSTAL #656
MONTERREY, MEXICO

PATTERNMAKER

Need a man between 25 and 40 years of age that has patternmaking experience and, also, able to figure costs from blueprints. If your experience will meet these qualifications, there is an excellent opportunity for you. When replying, please give age, references and wages expected. Address: Box 244, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

Well experienced in gray iron, near Philadelphia. Thorough knowledge of production, metals, patterns, cupola, sand, mechanization, etc. References required. Good opportunity for advancement to executive management. Address: Box 247, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

STEEL FOUNDRY MELTER—METALLURGIST

Experienced in electric steel basic practice. Position would include direction and supervision of Melt Department and Laboratory. Forward resume of education and experience including salary requirement and availability. Address: Box 249, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

ASSISTANT METALLURGIST

In nonferrous foundry located in central Connecticut, producer of carbon, low and high alloys and ductile iron, requires an experienced Assistant Metallurgist. Applicant must have BS Degree in Metallurgical Engineering, practical experience in non-destructive testing, design of castings and customer relations. Submit resume and salary requirements. Address: Box 242, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Man between 30-50 years of age that knows centrifugal casting work and all types of nonferrous castings. Will give good man chance to split profits. Also sell some stock if proven to be successful. Address: Box 203, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ADMINISTRATOR

Gray iron foundry. Sales and finances. Must have good personality, well matured, available immediately. Address: Box 248, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PULL OVER LINE FOREMAN

Fully mechanized eastern foundry requires foreman to supervise eight station rollover line. Send resume. Address: Box 226, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

FOUNDRY DESIGN ENGINEER

Large manufacturer in Western Illinois—with a number of gray, nodular, and malleable iron and aluminum foundries in the Middle West—has excellent opportunity for the RIGHT man. He must be experienced in the design of mechanized foundry equipment, sand processing systems, etc., and be able to assume responsibility for development of major installations. Attractive salary, liberal pension, insurance and other benefits. Give detailed resume of experience, age, education, financial requirements, date available and a recent picture in first letter. Reply to:

BOX 253, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY FOREMAN-SUPERINTENDENT

An Eastern soil pipe manufacturer has an opening for an experienced foundryman. Must be mechanical and a good manager and must have good references. Address: Box 238, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION OPEN

Permanent mold foundry foreman or assistant foreman experienced. Excellent opportunity with growing established company. Give complete reference and experience. Address: Box 235, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Nonferrous metallurgist wanted to work in aluminum foundry. Must be versatile and have well rounded experience. Address: HAMPDEN BRASS & ALUMINUM COMPANY, 262 LIBERTY ST., SPRINGFIELD, MASS.

Positions Wanted

POSITIONS WANTED

Just arrived from Volvo Foundry, Sweden, two Swedish foundrymen seeking new positions in U. S. A., preferably West. ENGINEER, 35, with 12 years of foundry experience, 5 years in U. S. A. Experienced in plant engineering, equipment design, projecting, maintenance and quality control. Desire position as Plant Engineer or Equipment Designer. GENERAL FOREMAN, 41, with 24 years of foundry experience, 5 years in U. S. A., 13 years as supervisor. Ferrous and nonferrous. Mechanized and jobbing shops. Experienced in all phases of foundry work. Desire position as Foreman or Superintendent. Address: Box 251, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER

Thirty-two years' experience covering gray cast iron, malleable cast iron, pearlitic malleable cast iron, and cast steel. Experience in automotive, agricultural, stove plate and enamelware castings. Work - background—manager, foundry consultant, sales engineer, operating foreman and metallurgist. Aggressive. Salary open. Address: Box 209, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER—FOUNDRY SUPPLIES SALES AND PRODUCT DEVELOPMENT

Eighteen years' experience in sales, sales management and product research on core oils, binders and related products. Thoroughly familiar with raw materials procurement, formulation and marketing. Personally acquainted with practices, buying habits and personnel of principal mid-western and eastern foundries. Will consider responsible position requiring full knowledge of foundry supplies marketing procedures. Address: Box 239, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 245, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

GENERAL ASSISTANT

Foundryman with fifteen years' experience in all phases foundry operation and general administration. Experience includes plant superintendent, chief estimator, purchasing agent for foundry and machine shop, and production manager. Also accounting and sales experience. Prefer east or southeast. Presently employed. Age 40. Address: Box 254, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

NONFERROUS FOUNDRY SUPERINTENDENT

Thorough knowledge of all types of nonferrous jobbing work. Copper, aluminum bronze, magnesium bronze a specialty, 53 years old, 37 years at jobbing foundry, core room, also. Twelve years as supervisor. Address: Box 240, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION WANTED

South America, Mexico, Foreign. Capable, aggressive young executive with diversified administrative and technical background, requests opportunity, steel, gray iron, malleable. Address: Box 176, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN

Fifteen years' foundry experience, three years in Meehanite supervision, twelve years' apprenticeship and journeyman time in steel. Age 34. Willing worker, desire position with future. Address: Box 221, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER

Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 213, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION WANTED

Twenty-five years' experience in coreroom supervision both steel and gray iron, in jobbing and mechanized foundries, on blowers, rollover and bench. Excellent references. Address: Box 219, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-SUPERINTENDENT

Ferrous and/or nonferrous, 38 years of age with 12 years of extensive foundry experience. Qualified to handle all phases of foundry operation. Detailed resume on request. Address: Box 234, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGEMENT ASSISTANT

Twelve years' experience in gray iron and aluminum jobbing foundry. Practical knowledge of time study, incentives, standard cost estimating and purchasing. Address: Box 246, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

With broad experience, technical, operating and executive both U. S. and Europe, available for trouble shooting or consulting during period October 15-April 15. Address: Box 208, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PRACTICAL ENGINEER ON PLASTER MOLD CASTINGS

Over 20 years' experience in pressure cast pattern equipment, tire mold castings, foam rubber and precision casting. Have excellent knowhow in casting many nonferrous metals into plaster molds. Address: Box 250, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumber supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 222, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Practical and technical, 30 years' experience jobbing and production. Familiar with every phase of the foundry. Now employed. Address: Box 228, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLEANING ROOM FOREMAN

With 25 years' experience processing castings of all kinds. Free to relocate. Address: Box 252, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Representatives Wanted

CASTING SALESMAN

A well established Eastern foundry has an opening for an experienced man to sell large and medium size gray iron castings. Must have foundry experience and be familiar with blueprints, and willing to cover entire Eastern area. Relocating will be necessary.

FREDERICK IRON & STEEL, INC.
FREDERICK, MARYLAND
Contact:
MR. JAMES E. TUCKER, SALES MANAGER
TEL. MO 3-5111

DIE CASTING SALES REPRESENTATIVE WANTED

Well established Die Casting Company in Western New York has openings for aggressive sales representation in New York State, Ohio and Pennsylvania. Excellent opportunity for manufacturer's agents or firms now handling allied lines. For complete information, Address: Box 237, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANUFACTURERS' REPRESENTATIVES

A leading pressure cast matchplate manufacturer, preparing to introduce new items, is planning to change its sales plan to a local representative organization. Men now calling on pattern shops and foundries are urged to write, listing their qualifications and experiences. An unusual chance to get in on the ground floor with an established company now selling from coast to coast. Address: Box 257, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Experienced nonferrous metal salesman and buyer—Eastern United States. Reply advising experiences and other information pertaining to former or present connection. Address: Box 215, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVES

Foundry consulting organization offers non-conflicting opportunity to initiate new contracts for precision casting process. Replies held in strictest confidence. Address: Box 231, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED

Leading foundry supply company, selling both supplies and equipment, requires the services of an energetic sales representative to cover the States of Virginia, North Carolina and South Carolina. Looking for man with foundry experience and sales ability. Good opportunity for the right man. Address: Box 259, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED

Midwest nonferrous foundry has open territories. Want aggressive sales representative with good coverage in his area. Address: Box 261, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Available

MANUFACTURERS' REPRESENTATIVE

Degree in Metallurgy and ten years experience in foundry industry, desire connection with steel and malleable iron foundry. Presently covering southeastern Pennsylvania, Maryland and Virginia with established aluminum, bronze and gray iron accounts. Address: Box 241, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATION AVAILABLE

Warehouse with railroad siding and competent and experienced sales force available to handle foundry supplies, binders, equipment in the East. Location: Pennsylvania. Address: Box 236, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS

Confidential Inquiries Invited
From Employers and Qualified Applicants

For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

Foundry Consultants

CONSULTING ENGINEER
Thirty-five years' Experience
Acid and Basic Practice

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing, and organizing of your melt shop.

EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

HEVERLE & HAY
ENGINEERING—ACCOUNTING
CONSULTANTS TO INDUSTRY
(Since 1907)
COST CONTROL—COST REDUCTION
FOUNDRY METHODS
121 NORTH BROAD STREET
PHILADELPHIA, PA.

FOUNDRY CONSULTANT

Cupola melting, core and mold production, sand control system. World-wide service. For improved operations, scrap reduction, with best results. Call or Write: CHARLES B. SCHOFIELD, 1912 NORTH AMES, SAGINAW, MICHIGAN, PHONE: PLeasant 2-2359.

FOUNDRY CONSULTANT—NONFERROUS

Sand — permanent mold — centrifugal permanent mold—and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, 253—8th STREET, WEST PALM BEACH, FLORIDA, PHONE: TEMPLE 2-8685.

PRECISION CASTING

Layout, planning, equipment design, processing techniques, marketing. Will accept short or long term assignments. Address: Box 229, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

Wanted-To-Buy

MELTING FURNACES WANTED

Arc type, about 50# or 100# capacity. Detroit Rocking or similar. Induction unit also considered. Address: Box 260, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MIXER WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

WANTED TO BUY

Used Transite Core Plates. Must be straight and free of cracks. Approximate sizes desired:

6" x 18" x ⅛" thick
10" x 13" x ⅛" thick
14" x 16" x ½" thick
12" x 24" x ¾" thick
12" x 36" x 1" thick
16" x 20" x 1" thick
18" x 22" x 1" thick
24" x 36" x 1" thick
30" x 30" x 1" thick
34" x 34" x 1" thick

Advise quantity available and best price.

BOX 256, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

FOUNDRY—WANTED—EQUIPMENT

Foundry investment organization needs used equipment to activate and mechanize a large foundry. Complete foundry with or without property will be considered. Please be specific as to price and when inspection can be made. Principals only. All replies confidential.

BOX 255, FOUNDRY
PENTON BLDG. **CLEVELAND 13, OHIO**

EQUIPMENT WANTED

One aluminum heat treat furnace, pit type, 48" dia., 60" deep, electric.

CURTO-LIGONIER FOUNDRY CO.
1215 NORTH 31st AVENUE
MELROSE PARK, ILLINOIS

WANTED

M.G. high frequency steel melting furnace approximately 30 to 100 K.V.A. Address: BURDEN BROS., 54 DERBY ST., LIDCOMBE, N.S.W. SYDNEY, AUSTRALIA.

For Sale

COMPLETE NONFERROUS SMELTING AND LABORATORY EQUIPMENT

Includes 6,000 lb. Simplex Reverberatory Furnace motorized, new lining in perfect condition. Pouring bale, Rotocast 12 ft. conveyor with ingot molds. Spencer Turbo Blower and motor. Complete laboratory and equipment. We will supply all necessary precipitation instructions.

COMPLETE PRICE $6,500.00

One 14 ft. Rotocast Mold Conveyor excellent operating condition.

COMPLETE PRICE ..... $ 500.00

One Ingersoll-Rand type 40, model 25 compressor, 100 CFM completely reconditioned with motor and base.

COMPLETE PRICE ..... $ 950.00

CAST-RITE FOUNDRY & MACHINE WORKS
BRETT AVENUE
DECATUR, ILLINOIS

FOR SALE

Simpson No. 1 Muller
Simpson No. 2 Muller
American Tumblast, 36 x 42
Fisher Furnaces #600 MNP
Coulter Furnaces #400 MNP
J & J #815 Jolt Rollover Pattern Draw Machine
Stedman Core Crusher, Hammer Mill
American Turnings Crusher #3800
Osborn #405 Rollovers
Elevators
Belt Conveyors
Shakeouts
International Rollover RES
Milwaukee 163 Jolt Stripper
Champion JSL 12 Pin Lift, jolt
Osborn 710J, Pin Lift
Osborn 212J, Jolt Squeezers
Osborn 275J, Jolt Squeezers
Osborn 276J, Jolt Squeeze
International LJS, Jolt Squeeze
International PJS, Jolt Squeeze
Milwaukee 104 Jolt Squeezers
Champion JS 108 Jolt Squeeze
Arcade 1008 Jolt Squeeze
Spo 110 Jolt Squeeze
Davenport Rollover 28 SA
International Rollover 30 x 8 portable
International Rollover 2410 G portable
International Rollover 30 x 8 no jolt
Tabor rollover 30 x 40 portable
J & J 610 B rollover portable
J & J 918 Rollover
International pin lift
Davenport pin lifts
Osborn 559 pin lift
Spo 506 jolt rollover, pin lift, draw
Nichols plain molding machine, high speed
International plain jolt, 36 x 45 table
International Type R core rollover, hand
Swing Grinders
Royer sand preparators
Simplicity preparators
B & P preparators
Blystone sand mixers
American Sand Cutters, Models M, AM, AA
Coleman core ovens
Porbeck core ovens
Grinders ½ hp to 25 hp
Disc grinders
Ladles from 50 lb. to 10,000 lb.
Pouring Devices 500 lb. to 2000 lb.
Gyratory riddles
Monorail and bridges
Air Hoists 250 lb. to 10,000 lb.
Overhead chain conveyor #458, track, drives.
Blowers-Centrifugal-positive-exhaust
Dust collectors all sizes

FLASKS
ALUMINUM
SLIP and POP
Sizes from 10" x 10" to 48" x 48"
JACKETS
Aluminum and Iron
STEEL FLASKS
Sizes from 10" x 15" to 9' x 9'
CORE PLATES
Transite —— Iron —— Aluminum
MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY — SELL — TRADE

THE HOMAN MACHINERY CO.
710 E. FRONT ST. MAIN 10339
CINCINNATI 2, OHIO

For Sale

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS
Unused—Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P. O. Box 51—Rochester 1, New York

FOR SALE

Campbell and Hausfeld tilting furnace #125, complete with blower and motor. Used very little.

KARBO BRONZE FOUNDRY
24 VAN DYKE ST.
BROOKLYN 31, NEW YORK

FOR SALE

Wheelabrator Tumblast 36" x 42"..... $2,000
Screenarators, Beardsley & Piper Model M $ 400
Osborn 275 PJ .. .. $ 200
Tabor Jolt Pinstripper 10" ..... $ 275
Pangborn Cabinets EN2 ..... $ 250
Wheelabrator Cabinets, Dust Collectors

M. ELSTEIN
426 GRAND STREET
JERSEY CITY 2, NEW JERSEY

FOR SALE

SPO Jolt Squeeze #110-J Portable
SPO #2114 Jolt Squeeze Pin Lift
OSBORN #275-J Jolt Squeeze Portable
MIXING LADLE, 2500# capacity
WHITING CUPOLAS, several sizes
DUST COLLECTOR, American (small size)
Lots of other Equipment, too numerous to list.

W. O. McMAHON
BOX 5943, HOMEWOOD STATION
BIRMINGHAM 9, ALABAMA
PHONE: TREMONT 1-2088

FOR SALE
Whiting Pulverizer—Size 3

Serial #590 with Type AA Induction 7½ HP motor, 220-440 Volt, 3 phase, 60 cycle, 1755 RPM. Includes piping and spare parts.

BELCHER MALLEABLE IRON COMPANY
EASTON, MASS.
Telephone: CEdar 8-2072

CLASSIFIED ADVERTISING

For Sale

Buy at Big Discount

HANSBERG SHOOTER DEMONSTRATORS

All machines listed have been used less than one week

H-1 Four-Pound Capacity
H-5 Seventeen-Pound Capacity
H-12 Forty-Two-Pound Capacity
H-25 88-Pound Capacity
H-80A 230-Pound Capacity

Also Davenport Hansberg Shooters with repair parts guaranteed by the U. S. manufacturer. Davenport Machine and Foundry Co.

D-42 Forty-Two-Pound Capacity
D-88 Eighty-Eight-Pound Capacity

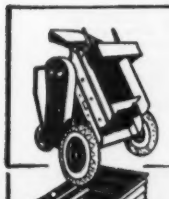
Write or wire for quotations on these Shooters and on parts.

GEORGE W. KOCH
251 HOLMES STREET
BETTENDORF, IOWA

FOR SALE

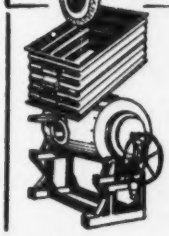
1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models, 307-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U. S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD CLEVELAND 10, OHIO



DUST COLLECTOR
1—Whiting Hydro-Clone, wet type, 4,000 c.f.m.
1—Roto-Clone, wet type, 5,000 c.f.m.

WHEELABRATORS
1—27" x 36", 5 cu. ft. Tumblast, w/loader
1—36" x 42", 11½ cu. ft. Tumblast, w/loader
1—42" x 48", 17½ cu. ft. Tumblast, w/loader
1—66" Swing Table, Wheelabrator

CRANE
1—Overhead CAB operated, 40 ft. span, 5 ton

HEAT TREATING FURNACES
2—4860EH Lindberg, 220 Volts, 90 KVA.

SAND SLINGERS
1—B-P Riddle type, 19" head, 4" tip
1—B-P Motive Jr., 19" head, 4" tip
1—B-P double belt, 19" head, 4" tip

SWING GRINDERS
10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACE:
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

CLASSIFIED ADVERTISING

For Sale

SAND BLAST EQUIPMENT
SELL-BUY-TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

$70,000 worth new Pangborn and Wheelabrator parts. Priced 25% less than list.

6' LF-14 Pangborn Table	$2000.00
4' LG-14 Pangborn Table	2200.00
9' LG-14 Pangborn Table	4500.00
6' LG-14 Pangborn Table	2500.00
Pangborn 8 x 8 Room	2800.00
Pangborn 55 EN2 Hand cabinet	325.00
Pangborn Auto Peening cabinet	1100.00
48 x 48 Wheelabrator Tum. w/loader	4000.00
42 x 48 Wheelabrator Tum. w/loader	2500.00
27 x 36 Wheelabrator Tum. w/loader	3000.00
8' Wheelabrator Table Blast	2000.00
14 LG5 Pangborn Rotoblast Multi-Table w/5—5' tables	9000.00
Pressure Tanks, all types	150.00 up
Vapor Blast cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. Jefferson
Detroit 9, Michigan
VI-3-6750

FOR SALE

1—1½F Type UD National Sand Muller complete with meters, dust hood, dust collector bucket loader, spare parts, automatic controls New in 1957. May be inspected at installation

THE HILL ACME COMPANY
1201 WEST 65TH STREET
CLEVELAND 2, OHIO

For Sale

FOR SALE

Pangborn Rotoblast Type ES-192, designed for cleaning of bath tubs. Unit complete with Schneible Collector, 825 gallon skim tank—two pumps. Blast cabinet 45'6" x 11'6". Seven rotors with 20 HP motors, 36 hooks on trolley conveyor—2 grit elevators, 6 separators. Spare parts inventory included. Unit offered on as is—where is basis.

RHEEM-RICHMOND PLUMBING FIXTURES
DIV. RHEEM MANUFACTURING COMPANY
P. O. BOX 111
METUCHEN, NEW JERSEY
Attention: Purchasing Department

FOR SALE

#1 SIMPSON MULLER
PORTABLE—LATE MODEL
NEWAYGO SHAKEOUT VIBRATOR
26" x 42" with 10' conveyor
Belt-Portable-Pneumatic tires

FOR THE BEST DEAL CALL
BALCHER MACHINERY COMPANY
695 E. 152ND STREET
CLEVELAND 10, OHIO
TELEPHONE: GLENVILLE 1-2474

FOR SALE

PANGBORN #21GK3 (49" x 54" Drum) Rotoblast Rocker Barrel with Dust Collector and 50 HP Exhauster. Address: WELDON F. STUMP, 4835 CRESTRIDGE, TOLEDO 13, OHIO, PHONE: TUrner 2-2006.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

Patterns, tools, machines, etc. for making hand and windmill force and lift water pumps. Good line for iron foundry to increase tonnage. Address: THOMAS KICKLER, 704½ MAINE, QUINCY, ILLINOIS.

For Sale

FOR SALE

2 Cupolas—24" and 36"
Molding Machine
2 Air Compressors
3 Gas Core Ovens
Core Sand Mixer—Motor Driven
Core Blowing Machine—Floor and Bench
Core Rollover Machine
Moulders' Friend Sand Cutter
Pouring Devices
Snap Flasks (Hines)
Wheelabrator (Small)
Screenarator
Tumbling Barrels
Electric Grinders—Motor Driven
Electric Hoist
Air Hoist
Lathe and Drill Presses
Lift Truck
Loading Platform
Scales (Platform)
Miscellaneous Items

E. F. Rogers—Superintendent

ACME FOUNDRY CORPORATION
5217 SWEENEY AVENUE
CLEVELAND 27, OHIO
MI. 1-4400
BE 2-1933 (nite)

Now Liquidating

Oliver Corporation's Gray Iron and Malleable Foundries at 533 S. Chapin St., South Bend, Indiana. LATE TYPE Foundry Equipment.

FOUNDRY

10—MULLERS, 5—B&P #80; 1—B&P #60; 2—B&P #40's with skips; 2—Clearfield #930, with new style crossheads.

8—MOLDERS HOPPER LINES—150 Hoppers.

10—"NO LEAK" Steel Slat Conveyors.

3—MOLD CONVEYORS.

20—Belt Conveyors, Trough and Flat Belt, some have magnetic pulleys.

8—Revivifiers and Sand Screens.

8—Overhead Sand Bins 1000 to 4000 cu. ft.

11—Shakeouts: Robbins, Simplicity, Link-Belt.

5—Oscillating Pan Conveyors.

9—Bucket Elevators 41 to 60 feet.

B&P Slinger, Turntable, Plate Feeder.

120—MOLDING MACHINES, JOLT SQUEEZE PIN LIFTS: SPO 2222, 2160C, 2160, 2148, 2136, 214, 113J, and 110J; OSBORN 276J and 275J. ROLLOVERS: SPO 507, and 506; JOLT SQUEEZE ROLLOVER DRAW 413D, PIN PUSHOFFS B&P AL2428.

7000' Roller Conveyor 12" to 26".

CLEANING ROOM

American Shot Blast, 3-48" x 48"; 3-42" x 36"; 4 Whiting geared motor drive tumbling barrels—12—HISEY WOLF Grinders, 30" to 18" wheel sizes—Wood Slat casting sorting conveyors.

3—Whiting Hydroclone Dust Suppressors.

5—Rotoclones—3 Bay type Dust Collectors.

CORE ROOMS

Core Blowers: 3—Demmler 2K, 2 Demmler #2; 4 Demmler #1; 1—Demmler #50; 2—International SB13; 9—Redford Bench type Rollovers; 1—Spo 507; 2—Spo 506; 1—International R.E.D.P. 6—Hand Rollovers. Coleman Car type and Young Brothers continuous core ovens, core racks, core buggies.

HEAT TREATING

4—General Electric 5 Ton Electric Annealing ovens 1750° and 1350°.

MELTING DEPARTMENT

Cupola—4 Whiting #7; 1—Whiting #6.

WHITING HYDROARC ELECTRIC DUPLEXING FURNACE, 4130# cold charge, 4160 volt, 1100 KVA.

2—Whiting Air Furnaces, 2—30A Coal Pulverizers.

2—Whiting 7½ Ton OET 107' span.

Whiting Tiger Charge Crane—3 Whiting U holding ladles. Overhead scrap storage, charge and weigh hoppers, Canton Shear, 55" Magnet.

3—Whiting Allis Chalmers Cupola blowers. Whiting Slag Disposal Units.—36 Modern Pouring devices, Scales 100# to 12,500#.

CRANES

2—Whiting 7½ Ton 108' Span OET Cranes.

35—CLEVELAND Bridge Cranes, 800' 10" arch beam, 2000 feet "T" Rail.

12—CLEVELAND Hot Metal Carriers, 2600'-10" Arch beam rail.

11—Electric Monorail Hoists 1—5000#.

3 STRAIGHTENING PRESSES: 500 TON H.P.M.; 50 TON and 25 TON OIL GEAR.

AIR COMPRESSOR—300 H.P. Synchronous Chicago Pneumatic.

WRITE • WIRE • PHONE

ACME EQUIPMENT CO., INC.

LIQUIDATION OFFICE: Phone Atlantic 9-9263 533 S. Chapin St. P. O. Box 486 • South Bend, Indiana
Chicago Office & Warehouses • 126 S. Clinton St., Chicago 6, Illinois • ANdover 3-3430

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—GARDNER DENVER ADR 6¼ x 3½ air cooled, 15 HP
1—AMERICAN Size 9 x 9, horizontal w/30 hp motor
1—I-R, model XRB, 125 HP, synch. motor, L.H. cyl. 8" x 10", R.H. cyl. 13" x 10".
1—KELLOG Model 350TV—5½ x 5", air cooled, 10 HP.

AIR & ELECTRIC HOISTS

85—I & R Air Motor type, sizes LC3, RC-5, A, B, C, D, D-6 & E 300, ½, 1, 2, 3 & 5 ton
15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
85—INGERSOLL RAND Air Motor Type. Sizes RC-5, A, B, C, ¼, ½, 1 ton.
1—SHAW BOX 2 ton load lifter.
2—YALE ¼ ton.
2—YALE 2 ton "Cable Kings" w/power trolley.

BUCKET ELEVATORS

12—LINK-BELT & JEFFREY, 30, 40, 50, 60 ft. cc. 10 x 7, 12 x 7, 14 x 7 16 x 8 buckets

CUT-OFF MACHINES

2—AMERICAN H-Rod Straighteners.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—MILWAUKEE #3A Bench Type.
1—SAN-BLO Model CB-40-B, 40# Cores.
1—SAN-BLO Model 40P-1, w/pulsator.

CORE OVENS

1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.
1—YOUNG BROS. 6' x 6' x 9' double door, rack type, gas fired.

CUPOLAS, BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—ROOTS 7,000 CFM, 50 HP motor.
1—ROOTS CONNERSVILLE Type RCS Size 20 x 60 w/75 HP motor.
1—MODERN No. 3¼ Cupola.
1—CUPOLA Bondactor, style 1205-L.
1—WHITING No. 6 Cupola.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 10, 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—TOCCO 20 KW Induction, 9600 cycles.
3—AJAX No. 100 & 300 Furnaces Only.
1—DETROIT Size CM — 4000# Cold Charge, 8000# Molten Metal, w/1000 KVA transformer.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP electric Tilting. Sizes 150, 400, 600, 1000, 1700, 2000 & 2400#, aluminum capacities. Gas or Oil Fired.
29—LINDBERG & HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.
1—LINDBERG #400 BBI hand tilt
1—LINDBERG #300 Cruc., ATH, hand tilt.
1—STROMAN Model JC Cradle Type Hydraulic tilt, 2000# capacity. Iron.
1—STROMAN, Model "U," 600# Reverberatory Hand Tilt.

HEAT TREAT FURNACES

2—LINDBERG 2236EH pit type, 22" D x 36" H, elec.
1—LINDBERG 3360G17 pit type, 33" D x 60" H, gas
1—L & N "Homo" 14" D x 16" H, elec.
1—SURFACE COMBUSTION, box 8' W x 10' L x 9' H.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

Snagging

2—U. S. #64, 20" x 3", 7½ HP. 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.
3—U. S. No. 62VS, 24" wheel, 2-7½ HP motor, variable speed

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder. 16" dia. Wheel.

Horizontal Disc

GARDNER No. 124—53" wheel, 20 HP.
GARDNER No. 179, 70" dia. wheel, 40 HP.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000 lbs. capacity.
7—MODERN & WHITING Cylindrical Mixing Ladles, 2 & 3 ton capacities. Electric & Manual Tilting.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN SPO, MILWAUKEE, Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.

Plain Jolt

1—HERMAN 8' x 12' table, 32,000# cap.
1—J&J 50 x 72 Table—5000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
2—DAVENPORT 40-SA, 42" x 50" table.
1—DAVENPORT #24, 24" x 40" table
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series, 40" x 60".
14—INTERNATIONAL Type G, Sizes 20" x 8", 24" x 10".
2—J&J #612, 24" x 30" Table.
4—J&J #918, 44" x 54" Table.
1—J&J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
1—MILWAUKEE #60B-3, 60" Flask.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs Cap.
2—OSBORN 643 Table 35" x 50"—2000#.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 508, table size 28" x 30".
1—SPO 506—24" x 30" Table 10" Draw.
2—SPO 9546, 26" x 32" table.
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 42" table, 10" Draw.

Jolt Pin Lift

3—INTERNATIONAL JDP 1600 X 10" draw, 36" x 36" Table.
2—J & J No. 683, 25 x 30 Table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
1—SPO #3102, 42" x 50" Table.
1—TABOR, 22" x 32" table

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs, up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE No. 165, 24" x 30" table, 16" sq. cyl.
3—MILWAUKEE #196, 17" x 38" Table, 19" cyl.
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
9—OSBORNS 714PJ, 20" x 31" Tables.
4—INTERNATIONAL PKL, 17" x 26".
1—INTERNATIONAL PK-20, Size 20" x 8".
2—SPO 2192-R, 24" x 40" table.

CONVEYORS

Steel Apron

9—JEFFREY & LINK-BELT 24", 30", 36", widths. Lengths built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK-BELT 48" x 154', 20 HP Motor.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.
LINK-BELT "FLEXMOUNT"
1—6" W x 50' L x 4" deep pan
1—12" W x 21' L x 4" deep pan
1—12" W x 26' L x 4" deep pan
1—18" W x 18' L x 4" deep pan

Roller

2500' MATHEWS 6", 12", 18" & 20" wide, 2 3/16" dia. roller, 1 1/16" hex shaft, 4" channel.
1500—MATHEWS 12" wide, 3½" dia, 1" hex shaft on 6" centers, 6" channel.

Mold

3—LINK-BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK-BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

MOLDERS HOPPERS & STORAGE BINS

7—NATIONAL & LINK-BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

ROTO-LIFT

1—OSBORN No. 3161-12, New 1955

SAND MULLERS

1—B & P #40, Speed Muller, 6 cu ft.
1—B & P #50, Speed Muller, 9 cu ft.
1—B & P #60, Speed Muller, 12 cu ft.
2—B & P #70, Speed Mullers, 18 cu ft.
1—BESSER Paddle Type, 30 cu. ft.
2—CLEARFIELD No. 610 w/skip hoist loaders. 10 to 14 cu ft batch.
1—CLEARFIELD #404, 4 cu. ft. batch
1—DRAVO-DOYLE 6 cu ft cap. Port.
1—LINK-BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH.
1—SIMPSON No. 1H Style UD—500#.
1—SIMPSON #1½, Style UD, 700 lb. w/loader.
2—SIMPSON #2, Style UD, 1500# w/loader.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu ft paddle type.
1—LANCASTER No. EDG-4, 5 cu. ft.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—ROYER Complete conditioning units including Shakeout, Belt Conveyor and Sand Blender.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP, NRS.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—AMERICAN "Sand Master," 102"/70" Cutting Blade—1952.
1—MOULDERS' FRIEND 60" Brush.

SANDSLINGERS

1—B & P Motive Speedslinger
1—B & P Motive Jr., 300 cu ft tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.
6—B & P Tanks for slingers

SHAKEOUTS & SCREENS

2—LINK-BELT 5' x 10', 6 ton cap.
3—SIMPLICITY 4' x 6' Model B
1—SIMPLICITY 4' x 8' Model D
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
2—ROBBINS 3' x 4' JF6—2000#.
2—ROBBINS 3' x 5' JF6—2000#.
1—ROBBINS 4' x 6' JF9—8000#.
1—ROBBINS 4' x 8' JF9—10,000#.
1—ROBBINS 6' x 10' JF11—20,000#.

SAND BLAST EQUIPMENT

1—AMERICAN 20" x 27" w/dust collector.
1—AMERICAN 36" x 42", w/skip hoist.
2—AMERICAN 48" x 42", w/skip hoist.
1—AMERICAN 27" x 36", w/skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7-14" tables.
2—AMERICAN 36" Continuous Tumblasts, 1952.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN No. 53 type EN-2 blast cabinet with dust collector.
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.
1—PANGBORN 6LG-14 Multi-Table w/dust collector.

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes: 30" x 48", 24" x 48", 30" x 60", 36" x 84", 42" x 72", 48" x 72", 48" x 96", 72" x 120".

AAA MACHINERY & EQUIPMENT CO.

10900 CEDAR ROAD—CLEVELAND 6, OHIO—CALL SW 1-3900

THE ACME BARGAIN PAGE

AIR COMPRESSORS
2—INGERSOLL RAND 450 cfm., 100 hp., 220-440 V.

BELTING
29" x 180' 24" x 162'
24" x 263' 24" x 120'

BLOWERS
INGERSOLL-RAND 10,000 cfm., 32 oz., 150 hp., 220 V.
GE 10500 cfm., 20 oz., 85 hp., 220 V.
GE 7500 cfm., 20 oz., 89.6 hp., 220-440 V.
GE Centrifugal 6200 cfm., 24 oz., 58 hp. motor
INGERSOLL-RAND 4000 cfm., 60 oz., 100/25 hp., 220-440 V.
NORTH AMERICAN 1050 cfm, 16 oz.
SPENCER 7350 cfm, 16 oz., 50 hp.
SPENCER 2850 cfm., 16 oz., 20 hp., 220-440 V.
SPENCER 2250 cfm., 16 oz., 15 hp., 220 V.
SPENCER 270 cfm., 8 oz., 3 hp., 220-440 V.

CONVEYOR OVERHEAD CHAIN
1700' JERVIS B WEBB and LINK-BELT #678 with trolleys 36" centers. 2-5 hp. Variable speed caterpillar drives, & motor generator set, takeups and turns.

CONVEYOR
36" x 162' LINK-BELT Oscillating Pan 10 hp., 220-440 V.
36" x 53' LINK-BELT Oscillating Pan
17' BARBER GREEN Bucket Conveyor
30" x 25' Magnetic Belt Conveyor w/drives, 2 hp., 220-440 V.
18" x 10' Steel Apron Conveyor w/drives, 3 hp., 220-440 V.
16" x 120' Rubber Belt w/drives

CORE BLOWERS
DEMMLER #2, 20# cores
DEMMLER #2K, 20# cores
REDFORD #2 up to 5# cores
REDFORD Bench types, horizontal or vertical clamping
2—CB15 55# cores, Universal blow plate
C.B. 10 up to 12# cores, 4½" draw
DEMMLER #4 up to 250# cores
INTERNATIONAL SB15H, up to 150# cores. Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
INTERNATIONAL SB 12, medium sized cores
INTERNATIONAL SB 11, medium sized cores
6—OSBORN 193 up to 50# cores
OSBORN 2035-2 large sized cores

CORE GRINDERS
7—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

CORE OVENS TOWER
COLEMAN Vertical-Horizontal 9000# per hour
COLEMAN Vertical-Horizontal 6800# per hour

CORE PASTE OVENS
COLEMAN 28' Horizontal

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw

CRANES
P&H 5 TON Electric Traveling DC motors 50' span
P&H 3 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports
10 Ton AMERICAN Railmaster Low headroom floor control

CUPOLA GUNS
2—BONDACTOR #1250
BONDACTOR #1000

DUST COLLECTOR
PARSONS 40,000 cfm. cloth bag type

ELECTRIC MELTING FURNACES
SWINDELL 9' Dia. Top Charge cap. 3 ton steel 5 ton iron per hour, 3500 KVA 13800 volt transformer, complete in place
1—"LECTROMELT" 2 TON Size Q 4000# per hour 1500 KVA 13200 Volt
LECTROMELT 500#, Size T, 300-375 KVA 2300 V primary, Moore controls, G.E. circuit breaker

ELECTRIC MELTING FURNACES
SINGLE PHASE
1—DETROIT "LFA" 350# shell 13200 V.
1—DETROIT "LFC" 700# & 350# Tapered Shell 2300 V.
2—DETROIT "LFC" 350# Tapered shell 7200 V.

FURNACE TRANSFORMERS
1—"LECTROMELT" 800 KVA, 12000 V., 3 phase
1—WESTINGHOUSE 500 KVA, 11200 V., 3 phase
1—WESTINGHOUSE 2500 KVA, 13800 V., 3 phase

FURNACES NONFERROUS
CAMPBELL HAUSFELD Staty. pot type
1—HEVI-DUTY HD-181-S Pot type, Electric
2—400# FISHER Gas Fired Tilting Furnaces
4—600# FISHER Gas Fired Tilting Furnaces
1—600# FISHER Gas Fired Stationary Furnace
FISHER RB100 Gas Fired Crucible
3—CAMPBELL HAUSFELD Gas Fired 625# brass hand tilt
1000# STROMAN DC double dipout w/complete controls

GRINDERS, SNAG
FOX 24" x 2" Single Wheel 10 hp.
2—HAMMOND 20" DE 10WR1 10 hp., 220-440 V.
1—HAMMOND 20" DE Porter Cable backstands 10 hp.
1—HAMMOND 24" x 2" x 12" 7½ hp., 220 V.
HAMMOND WR-2, 2 speed, 30" x 3" wheel

GRINDERS, SWING FRAME
MARSCHKE 24" x 3" x 12" 20 hp., 220 V.
U.S. 24" x 3" x 12" 15 hp., 220-440 V.
2—MARSCHKE 3 hp., 12" wheel
1—B&D 7½ hp.

GRINDERS, MISC.
PORTER CABLE BG8 Wet-Dry Belt
U.S. #70 Combination 20" disc and 20" x 3" x 1½" wheel

HEAT TREATING FURNACES
HOLDEN #202 Electrode Type, Bright hardening annealing 1850°
DESPATCH DT36 Pit type 42" x 40" Electric
LINDBERG 48" x 48" x 72" Elec., 1250°, box type.

HOISTS
10 ton SHAW BOX electric hoist
SHAW BOX 5 TON floor control hand travel
4—INGERSOLL-RAND Air trolleys
1—500# INGERSOLL RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers

LADLES
1—6000# Industrial Enclosed Gear Crane
1—5000# Modern Enclosed Geared Crane
3—2125# Industrial Enclosed Geared Crane

LADLE MIXING
4000# Industrial, Insulated

MOLD BLOWER
TACCONE TD4 24" x 32" flask

MOLDING MACHINES
JOLT SQUEEZE PIN LIFT
3—#165-6B MILWAUKEE TABLE, 24" x 30"
2—#125-3 MILWAUKEE TABLE, 21" x 27"—12" cyl.
2—OSBORN 712 PJ, 18" x 21" table
1—CHAMPION JSL10P 18" x 21" table 6" draw
2—#2114 G. SPO TABLE, 26" x 27"—11" cyl.

JOLT SQUEEZERS
2—INTERNATIONAL, LJS12 16" x 20" table
1—SPO, 110J Portable 17" x 20" table
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ

JOLT ROLLOVER DRAWS
DAVENPORT 28A, 1500#, 29" x 40" table
1020 JOHNSTON & JENNINGS, 60" x 50" table
JOHNSTON & JENNINGS 918, 44" x 64" table, 20" draw, rollout table
1—1500# HERMAN 26" x 48"
2—750# HERMAN 20" x 30" table
2—INTERNATIONAL RJ 20" x 12"
3—SPO 9032

JOLT PIN LIFTS
2—INTERNATIONAL 1200-S 26" x 27" table, 8" draw

PIN LIFT PUSHOFF
CHAMPION 28" x 42" table
MILWAUKEE 620ND 20" x 24" table

MULLERS and MIXERS
2—#1 SIMPSON Mullers

SAND CUTTERS
1—ROYER MCZ-43

SAND SLINGERS
1—B&P Tractor, 19" heads
B&P 2 speed 40/25 hp. double belt
B&P w/plate feeder
B&P sand slinger head w/Syntron feeder and hopper
2—NEWAYGO super Handy Sandy sand handling systems. Like new

SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic feed
30" TANNEWITZ, 3 hp., 440 V.
42" TANNEWITZ, 5 hp., 220-440 V.

SAWS, CUTOFF
DELTA Abrasive cutoff

SCALE
FAIRBANKS PRINTOMATIC 6250#

SCREENS
3' x 8' SIMPLICITY

SHAKEOUTS
3' x 5' ROBBINS
3' x 5' SIMPLICITY
5' x 6' SIMPLICITY
4' x 10' SIMPLICITY

SHOT BLAST
SLY #4, 20" x 20" w/dust collector

SPRUE CUTTERS
2—PERKINS #53 1¼" stroke
1—MILWAUKEE #85 TON

TESTING EQUIPMENT
ARLIN Automatic Rockwell, continuous type
COLEMAN 55 Spectrophotometer
BALDWIN SOUTHWARK 20,000 Tensile Tester w/load indicator and recorder
TYLER ROTAP Testing Sieve w/screens

TUMBLING BARRELS
2—ROYERSFORD, 42" x 72", chain drive, late
WHITING 60" x 72" 20 hp. drive
SLY 42" x 42" x 64" 10 hp.

WHEELABRATORS
2—42" x 48" AMERICAN Skip Loaders
1—27" x 36" AMERICAN Skip Loader
AMERICAN 27" x 36" Rubber Belt w/loader
AMERICAN Tablast 6-24" tables
AMERICAN Tablast 8-28" tables, late

WOODWORKING—PATTERNSHOP
GARDNER 30" DISC and Spindle Sander
JONES SUPERIOR 48" Double Disc
OLIVER 72DR Router or borer
BOICE CRANE 12" Planer
NORTHFIELD #4 Tilting Arbor Saw
TANNEWITZ 30 & 42" Band Saws

EKSTROM CARLSON #540 Universal Router Mill Drill

WIRE STRAIGHTENERS
AMERICAN type H rod ⅜"-⅝" cap.
2—#2A CLIMAX ¼"

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BLOWERS

25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure & Cent. Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS

1—15" x 2" AMERICAN WHEELABRATOR, Rubber Belt
1—27" x 36" AMERICAN WHEELABRATOR TUMBLAST, Rubber Belt
1—36" x 42" AMERICAN WHEELABRATOR TUMBLAST
1—48" x 42" AMERICAN WHEELABRATOR TUMBLAST, w/loader
1—36" Continuous AMERICAN WHEELABRATOR, side discharge, two heads, Serial #A95643. New 1953. Used 2 months
1—#1-A Multitable AMERICAN WHEELABRATOR, 6-26" tables, New in 1954, w/dust col.
1—PANGBORN TABLAST, 8' Table, 2500#
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round
4—SLY, 48" x 36" Round

CONVEYORS

1—JEFFREY, 3 compartment, ingot mold
1—LINK-BELT, vibrating, 80' x 24", w/exhaust hood
1—LINK-BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
2—LINK-BELT, 30" Steel Apron Conveyors, 100' Centers
4—SAND ELEVATORS, Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES
200 ft. WESTOVER Track w/100 Aluminum Pallets 31" x 19"

CORE BLOWERS

10—DEMMLER #1, #2, #2A, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #192, #91-10
1—RANDALL MODEL "A," Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

CUPOLAS

1—SKIP CHARGER for #9 Cupola with scale and buckets
1—WHITTING Skip Charger for #5 Cupola
2—WHITING #7, 7 ton cap. Never used. Fraction of cost!

DUST COLLECTORS

1—AMERICAN WHEELABRATOR, Model #115KD, 20' L x 9' W x 9' H
10—ROTOCLONE #12, Type N, #14D, #16W, #20D, #24W, #30W

FURNACES—DIRECT ARC MELTING

1—250 Lb LECTROMELT, Side Charge
1—500# LECTROMELT
1—3000 #/hr LECTROMELT
1—3000# HEROULT
1—3 Ton SWINDELL Hyd. Top Charge, 3000 KVA Transformer, Latest Type

FURNACES—INDIRECT ARC

1—350# DETROIT LFA
1—750# DETROIT LFY, Conical Shell
1—1000# DETROIT AA, 300 KVA
1—3000# DETROIT C, 500 KVA

FURNACES—INDUCTION MELTING

1—3 KW, AJAX, Lab type
1—35 KVA, AJAX SPARK GAP, High Freq.
1—333 KW, AJAX, 1000# steel

9' Swindell Arc Furnace

HYDRAULIC TOP CHARGE—COMPLETE

Because we must soon move this furnace, we are prepared to sacrifice it for Immediate Sale. If we dismantle and move this 6 ton furnace into our warehouse, we will not be able to ever offer you such an excellent furnace at this Very Low Price. Complete set of prints, engineering service available.

FURNACES—GAS & OIL

1—FISHER MNP, Gas Tilting, 1700#
1—400# FISHER MNP, Gas Fired
1—400# FISHER, Oil, Stationary
1—250# FISHER, Oil, Tilting
3—Stationary, Gas, 250# to 1000#
1—HAUSFELD, Tilting, 1200# capacity
1—STROMAN, Gas, 1000# cap. Alum., auto control hyd. tilt.
1—STROMAN, Gas, 600 lb. "U" Type

FURNACES—HEAT TREAT

1—2' x 3' x 6', gas fired, 1800° F.
1—4' x 4' x 10' Gas Fired Annealing
1—20" x 24" deep, L&N Homocarb electric
1—20" x 36" L&N Draw electric

MOLDING MACHINES

Jolt Rollover Pattern Draw

3—J & J #1020, 50" x 60" Table, 3000#
1—J & J #918, 44" x 54" Table, 18" draw
2—HERMAN 10,000#, 48" x 109" tables
1—HERMAN 6000#, 42" x 78"
1—HERMAN 3000#, 30" x 66" table
5—HERMAN 1500# to 30" x 48" tables
3—HERMAN 750# to 30" x 36" tables
2—INTERNATIONAL, 13" x 17" tables
1—OSBORN #602, 36" x 26", 900#
1—OSBORN #405, 3000#, flask size 64" x 57", 26" draw
1—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000# capacity
2—TABOR 30" x 40" w/air clamps, 1000#
1—TABOR 22" x 42", pattern draw, shockless, portable, 600#
1—TABOR 20" x 30" w/air clamps, 1000#
2—TABOR 14" x 16" Rockover, 150#

Plain Jolt

2—DAVENPORT, table sizes 24" x 27", 30" x 30", 1200# to 1800#

Jolt Pin Lift

1—HERMAN #4317, 22" x 30" table
1—J & J #681-C, 30" x 25" table, 600#
1—MILWAUKEE #1536, 32" x 38", 1500#
1—OSBORN #559, 25" x 30" table, 6" draw, 1200#
2—SPO #305, 750 lb
1—TABOR 17" x 20" table, portable
1—TABOR 20" x 24" table, 600#

Jolt Squeeze Pin Lift

2—INTERNATIONAL PKL, 18" x 24" table, 12" sq., 5½" draw, stat.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200#, 8" draw
2—MILWAUKEE #163, 15" x 24" table, 11" sq., 1500#
2—MILWAUKEE #165, 24" x 30" table, 16" squeeze
5—OSBORN #712J, #712PJ, 18" x 28" table, 12" sq., 6" draw, stat. & port.
1—OSBORN #716 PJ, 22" x 34" table, 1250#, 7" draw, stat.
5—SPO #2114P, 21" x 27" table, 600#
5—SPO #2136G, 21" x 30" table, 800#

Jolt Squeezers

4—INTERNATIONAL #10 LJS, 17" x 20"
1—MILWAUKEE #104-5, 17" x 21", port.
1—NICHOLS #12 F-P, portable, 600#
31—OSBORN #275PJ, #275J, 17" x 20" tables, 10" sq., 400#, stat. & port.
3—OSBORN #276J, 17" x 26" table, 13" squeeze, 500# port.
2—SPO #110J, 17" x 20" table, port.
8—TABOR 3" jolt, 18" x 20"

MATERIALS HANDLING

1—BYERS, Mobile Crane, BUDA Engine, 50' Boom 5 ton w/magnet & bucket
1—CLARK, Fork Lift, Gas, 3,000 lb, capacity, Solid Tire
1—HOUGH PAYLOADER, Model HA, 1000# cap., hyd. lift, mech. dump

MULLERS AND MIXERS

1—B & P #3½ Mulbaro, 3½ cu. ft. batch
1—B & P #30 Speedmullor, 3 cu ft batch
1—B & P #70 Speedmullor, 15 cu ft batch with cooling and skip loader
1—B & P, Conventional, SIMPSON type, 87½" Dia. arranged for cooling
1—CLEARFIELD #404, 4' Dia, 4 cu ft batch
1—CLEARFIELD #610, 6' Dia., 10 to 14 cu ft batch, w/loader
5—SIMPSON #0, U.D, 3' Dia, never used
1—SIMPSON #1, U.D., 4' dia., 4 cu. ft. batch
1—SIMPSON #2, 6' U.D. Dia, 14 cu ft batch
1—SIMPSON #3, 8' Dia. Unit Drive, with loader 20-25 cu ft batch

LADLES AND POURING DEVICES

Bottom Pour

2—MODERN Crane Type, 55" H x 50" top
1—MODERN Crane Type, 60" H x 60" top

Lip Pour

1—WHITING 40" x 40" top dia. geared

Cylindrical

8—WHITING, 26" L x 25" dia, 1100# iron
7—WHITING 19" L x 22" dia, 600# iron
3—WHITING, 38" L x 28" dia, 2200# iron

Pouring Devices

11—WHITING, 650# to 2000# gross cap.

OVENS

1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22" x 12' x 10'
2—GENRICH, Elec., 3 drawer, preheating, auto-control, 9' H & 8' W x 6'7" L
1—KOCHS BROS. Electric, 36" x 40" x 64" inside
1—PORBECK, oil, 5 drawer core oven
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'
1—THERMONIC Dielectric Core Oven, Model M900-A

SAND CONDITIONING

2—B & P Screenarator, Model "S" & "M"
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
2—ROYER, NC-2, 10-15 tons/hr, 1½ HP motor
1—ROYER, NC-4, 10-15 tons/hr, 1½ HP motor
1—ROYER PREPARATOR, Comb. Model NDC, 25 ton/hr scrap removal, 5' x 8' hopper
1—ROYER, NDP 15-25 ton/hr, 2 HP

SAND CUTTERS

1—AMERICAN, 15 HP, 96/78 Reel
1—AMERICAN, 10 HP, 48" Reel
1—B & P Nite-Gang

SAND SLINGERS

1—B&P Stationary, 2 Speed, 19" head, 4" tip
1—B&P Stationary, Single Speed, plate feeder
1—B&P Tractor Type, 19" head
1—B&P Tractor Type, 16" head

SHAKEOUTS AND SCREENS

1—SIMPLICITY Vibrex screen, 3' x 8'
1—ROBINS Vibrating Screen, 36" x 78"
1—SIMPLICITY 50" x 116" shakeout

MISCELLANEOUS

1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER, Model DX-5
FLASKS, CORE PLATES, All Sizes
500,000# Hyd. Compression Testing Machine
4" FOOTBURT Horiz. Bar Mill
5 Ton WELLMAN Charging Machine
1—TABOR Cut-Off Saw, 7½ HP motor
1—CLIMAX Model 2-A Wire Straightener 10 or 15 HP GRINDERS, Swing Frame
8—GRINDERS, Double End, Pedestal Type, U. S., Cinn., Gardner, 5, 7½ & 10 HP

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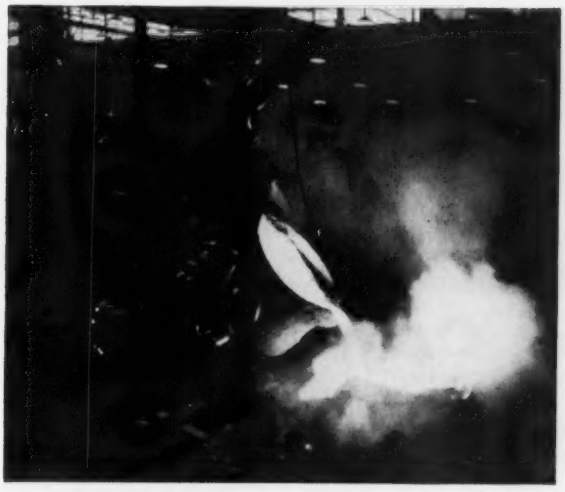

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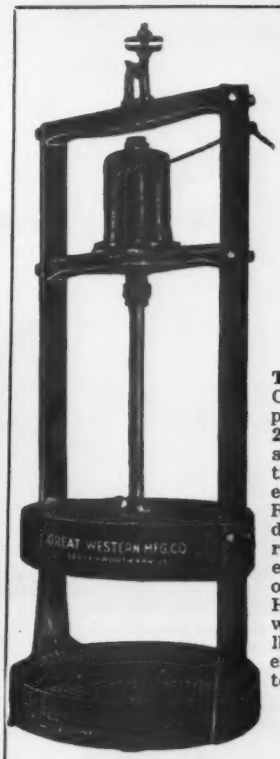

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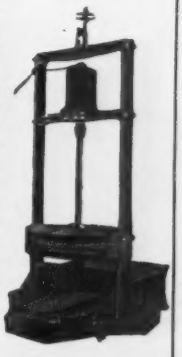
"The Greatest Name in Motion"



TYPE "CS". Complete price $395.00. 24" square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4'10", weight 295 lbs., ⅓ H.P. enclosed motor.

TYPE "CR". Complete price $385.00. 24" dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4'6", weight 250 lbs., ⅓ H.P. enclosed motor.

TYPE "HL". Price $285.00 complete, less sieves. Laboratory model especially designed for laboratory sand control, fitted with 1/6 H.P. enclosed motor.

PROMPT DELIVERY from your Foundry Supply House

TYPE "V". Price, 20" Sieve, $300.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20" dia. sieve with special clamp for 5-second changes. Height 4'6", weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36" sieve for triple capacity . . . Price $545.00.

MAIL THE COUPON NOW!

GREAT WESTERN MFG. CO.
Leavenworth, Kansas **Phone MU-22291**

☐ Send Additional FREE Information

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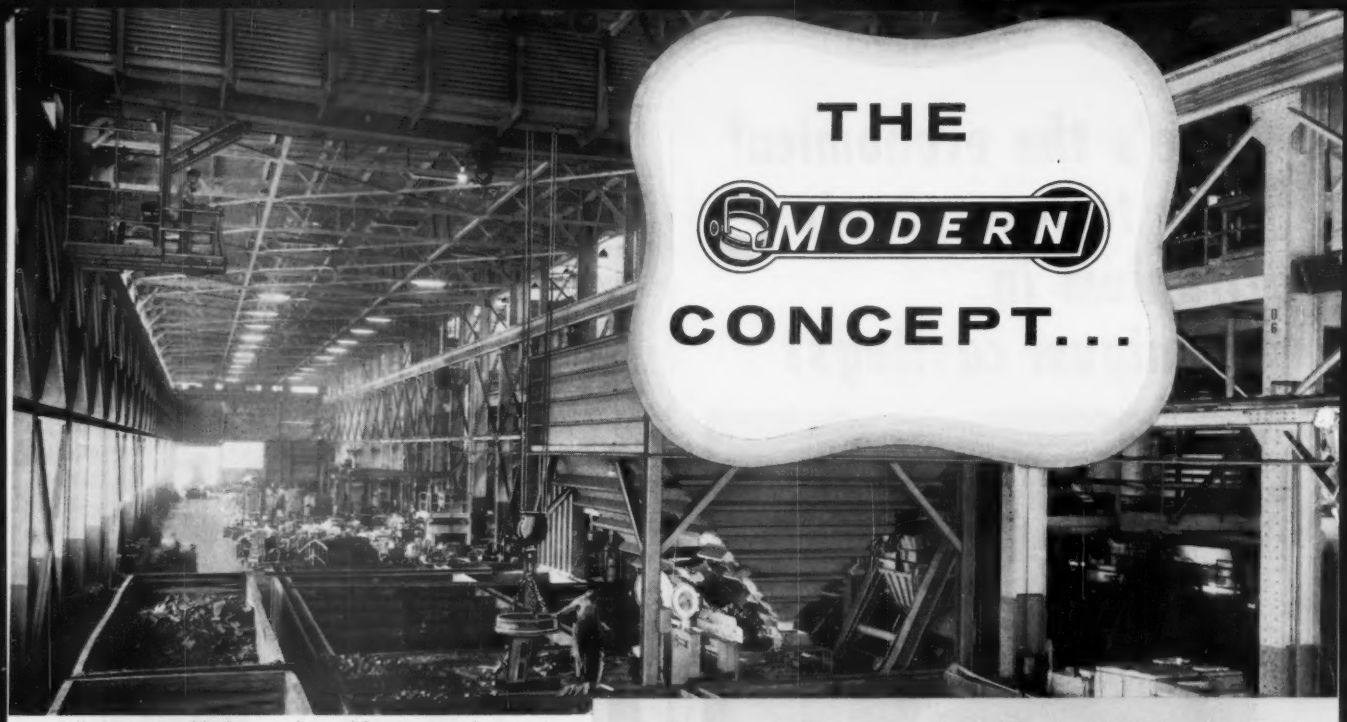
CITY _____ STATE _____

Circle 731 on Page 51

Next Page Circle 732→

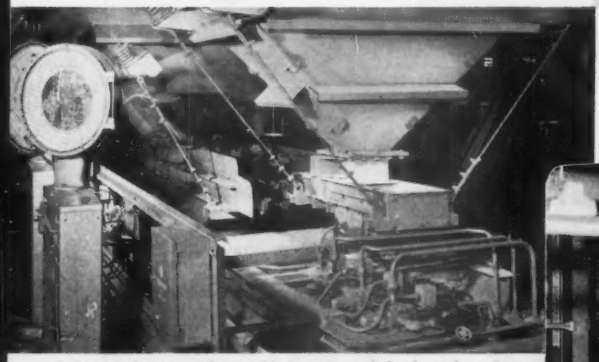
THE MODERN CONCEPT...



Full-size motor blocks are charged by crane and magnet through scale-mounted, weigh hopper to small-cone, orange-peel bucket.

in Cost Cutting!

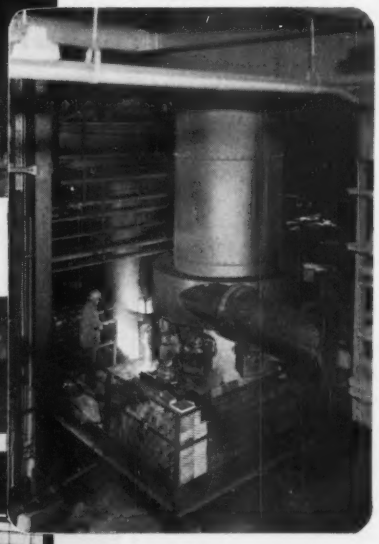
Automization of the charging, melting and pouring cycle may follow set patterns. Still every installation is different:



Coke and stone from bins are weighed and recorded automatically.

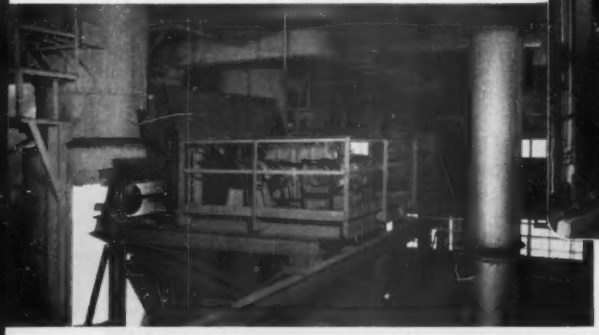
Upper portion of charger indexes to serve more than one cupola.

Slag is granulated in water and flows to sludge tank.

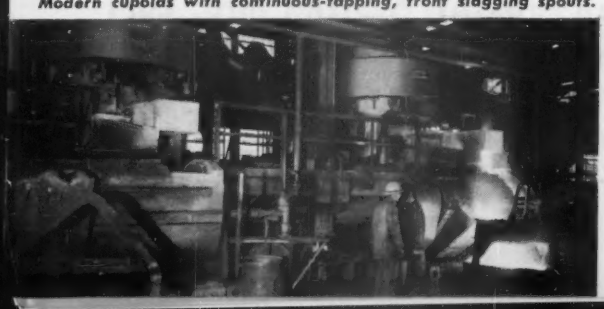


DIFFERENCES IN —

- *lengths of melting time and types of iron may alter cupola designs . . .*
- *cupola locations and yard conditions call for differences in swiveling and indexing of the charger . . .*
- *charging cycles determining the stock bin and feeder equipment.*
- *automatic weighing and recording instruments — inventory the components, eliminate human error and insure uniformity of metal . . .*



Modern cupolas with continuous-tapping, front slagging spouts.



In all these and other ways MODERN's single responsibility for engineering, fabrication and erection is cutting the tonnage costs for the Bullard Company. Other case studies in catalog 147-C . . .

MODERN EQUIPMENT COMPANY, Dept. F-11, Port Washington, Wisconsin

Mail to my attention:

- ☐ Catalog 147-C on charging and melting . . .
- ☐ Catalog 150 on cranes, and monorail systems . . .
- ☐ Catalog P-152-A on ladles and pouring . . .

Company.....

Street.....Box.....

City.....Zone.....State.....

My Name.....

"Facing" Facts

FROM STEVENS FACING DEPARTMENT

FOUR TIMES AROUND THE INDIANAPOLIS SPEEDWAY

IF DRUMS OF STEVENS LIQUID PARTING THAT HAVE BEEN USED BY FOUNDRIES EVERYWHERE WERE PLACED SIDE-BY-SIDE THEY WOULD STRETCH MORE THAN FOUR TIMES AROUND THE TWO AND ONE-HALF MILE INDIANAPOLIS SPEEDWAY.

NO DUST FOR MOLDERS TO BREATHE

MOLDERS USING STEVENS LIQUID PARTING SAVE TIME IN DUSTING DRY PARTING ON EVERY MOLD. IT ELIMINATES THE DUSTY AIR AROUND MOLDERS... KEEPS BREATHING ZONE CLEAN AND FRESH.

GET 40 MOLDS FROM ONE APPLICATION

ONE LARGE MIDWEST FOUNDRY THAT AVERAGES 1,200 TONS OF CASTINGS PER MONTH REPORTS UP TO 40 MOLDS FROM ONE APPLICATION OF STEVENS LIQUID PARTING.

LARGEST SELLING LIQUID PARTING IN THE WORLD

HAS BECOME PHENOMENAL "BEST-SELLER" BECAUSE OF IT'S GREAT ECONOMY AND MANY VARIED USES.

FOR ECONOMY YOU CAN'T BEAT. . STEVENS LIQUID PARTING

In the Stevens files we have many testimonials from foundries which state they have made up to 60 molds from a single application of Stevens Liquid Parting. We have hundreds of reports of 25 to 50 molds for a single application. That's positive proof of its economy. And it is one of the important reasons why Stevens Liquid Parting is the largest selling liquid parting in the world today.

Consider these additional features: Patterns are left clean, with no adhering sand . . . Molds always give smooth castings because sand separates cleanly . . . Molders save time and increase production since, unlike dry partings, it is not necessary to shake parting on the pattern for each mold . . . It eliminates any need for heating patterns or plates . . . There is no parting dust in the molder's breathing zone.

If you have never tried this great foundry item be sure to make an early test in your own plant soon. Call your Stevens Sales Representative or write direct to Frederic B. Stevens, Inc., Detroit 16, Michigan.

WHAT USERS SAY:

WE TRIED MANY OTHER BRANDS

"After trying several other liquid partings, we tried the Stevens product and must admit its superiority to all others."

NO STICKING IN CORE BOXES

"Since using Stevens Liquid Parting there is no sticking in the core boxes, and they have taken on a 'burnished' appearance. Results are very satisfactory."

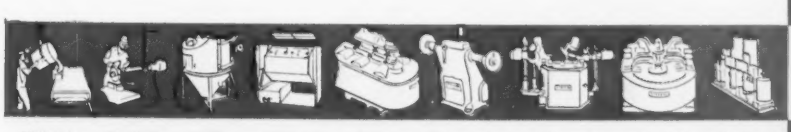
SOLVED OUR DIFFICULT CASTING JOB

"Stevens Liquid Parting enabled us to solve a difficult casting job of fins for an air cooled internal combustion engine."

COST IS NEGLIGIBLE

"The cost of Stevens Liquid Parting is negligible. On 625 tons of castings our parting costs were $60.00 or about 10c per ton of casting."

BRANCHES: BUFFALO • CLEVELAND • INDIANAPOLIS • NEW HAVEN



FOUNDRY FACINGS | GRINDING OPERATIONS | BLAST FINISHING | BARREL TUMBLING | METAL CLEANING | POLISHING & BUFFING | AUTOMATIC FINISHING | AUTOMATIC PLATING | METAL RECLAMATION

Metal Finishing equipment and supplies from castings or stampings to finished product

FREDERIC B. STEVENS INCORPORATED

EVERYTHING FOR A FOUNDRY

Circle 552 on Page 51

Still Another BARTLETT B-SNOW CLEVELAND 5, OHIO INSTALLATION

Complete facilities for sand handling, conditioning, shakeout and mold handling for low cost gray iron foundry.

THE C. O. BARTLETT & SNOW COMPANY

Designers, Engineers, Fabricators and Erectors of Foundry Equipment

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